ber 1949

DEC 27 '49

Chemical Industries

Including CHEMICAL SPECIALTIES

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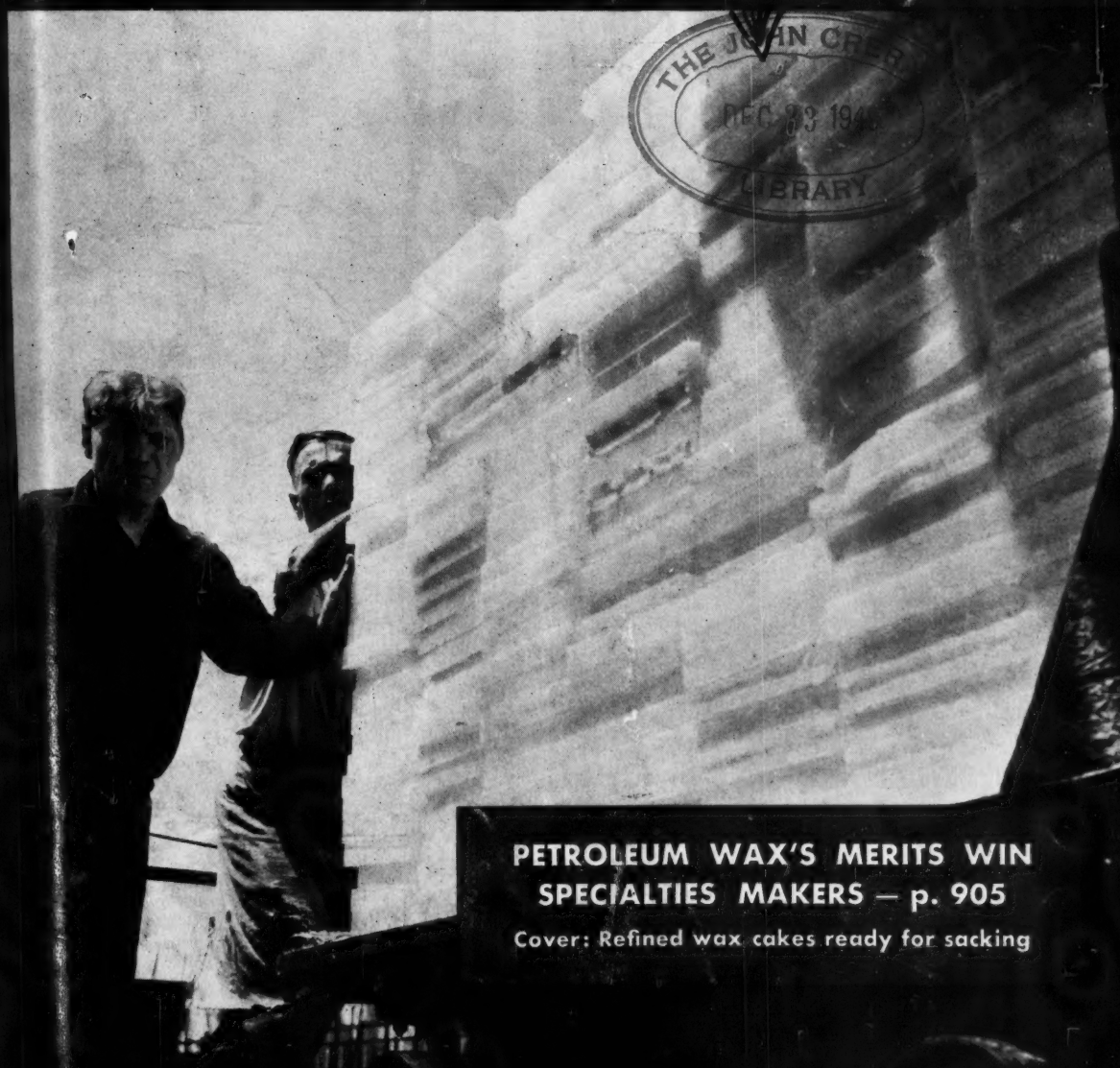
THE JOHN CRERAR
DEC 23 1949
LIBRARY

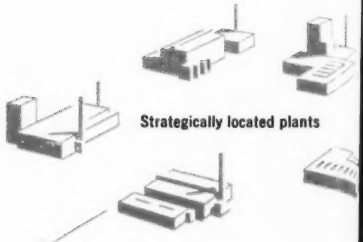


PETROLEUM WAX'S MERITS WIN SPECIALTIES MAKERS — p. 905

Cover: Refined wax cakes ready for sacking

Convenient sales offices—ample local stocks the nation over

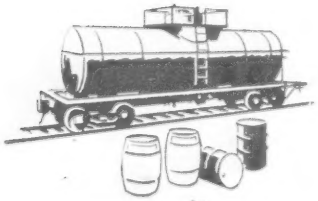
Specialized technical service



Strategically located plants

Whichever way you look at it...

Long experience
. . . accumulated knowledge



Quick delivery and shipping service

It pays to specify SOLVAY

TRADE MARK REG. U.S. PAT. OFF.

With today's costs of manufacturing so high, it's the wise chemical buyer who considers his purchases from every angle. Price and specification alone are no longer basis enough for a buying decision.

There is a good deal more a buyer can expect—speed of delivery, technical service, big-plant capacity to assure continued supply, knowledge of the industry and experience with its problems. On all these counts, more and more manufacturers agree, "it pays to specify Solvay."

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Ammonium Bicarbonate • Sodium Nitrite • Para-dichlorobenzene • Ortho-dichlorobenzene • Monochlorobenzene • Methanol • Ammonium Chloride • Formalde

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CAUSTIC POTASH

Liquid 45-50%. Flake and Solid.

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Liquid 50%—Standard and Rayon Grades.
Liquid 70-73%. Flake and Solid, 76% Na_2O.

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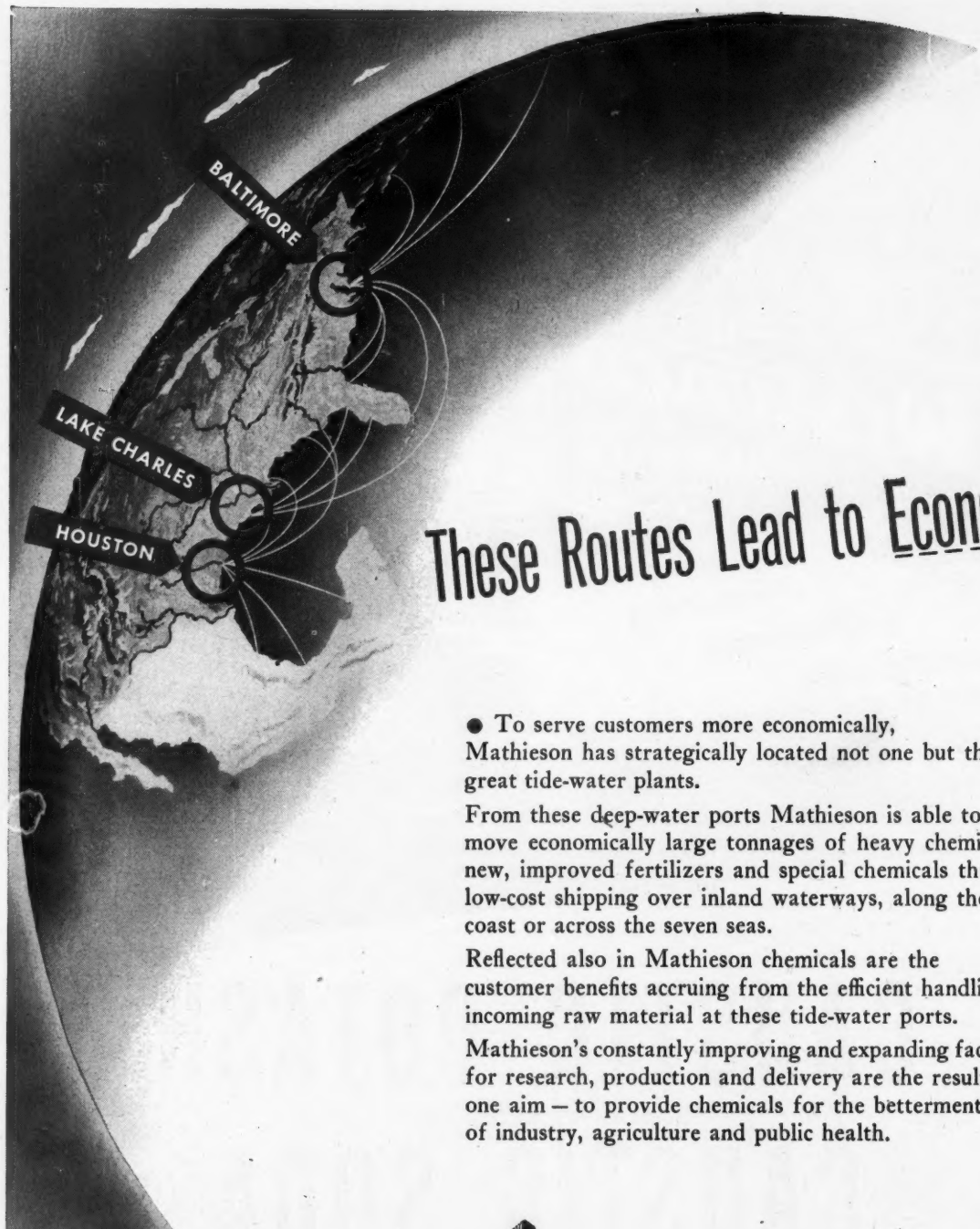
FOOD MACHINERY AND CHEMICAL



These Routes Lead to Economy

● To serve customers more economically, Mathieson has strategically located not one but three great tide-water plants.

From these deep-water ports Mathieson is able to move economically large tonnages of heavy chemicals, new, improved fertilizers and special chemicals through low-cost shipping over inland waterways, along the coast or across the seven seas.

Reflected also in Mathieson chemicals are the customer benefits accruing from the efficient handling of incoming raw material at these tide-water ports.

Mathieson's constantly improving and expanding facilities for research, production and delivery are the result of one aim — to provide chemicals for the betterment of industry, agriculture and public health.

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CHEMICALS

Mathieson Chemical Corporation
MATHIESON BUILDING,
BALTIMORE 3, MARYLAND

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

Chemical Industries

Including CHEMICAL SPECIALTIES

Vol. 65, No. 6

DECEMBER 1949

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

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ABP ABC

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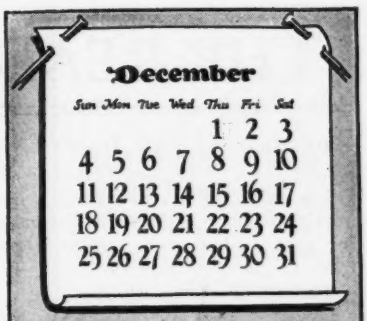

Plasticizer OF THE MONTH

DIBENZYL SEBACATE

Molecular Weight 382

Boiling Point 265° C @ 4 mm

Specific Gravity 1.055 @ 20/20° C

Saybolt Viscosity 82.0 Seconds 100° F

Color Light Straw

Weight 8.8 lbs. per gallon.

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DIBENZYL SEBACATE
DIHEXYL SEBACATE
DIHEXYL ADIPATE
DIHEXYL PHTHALATE
DIMETHYL SEBACATE
BUTYL BENZYL SEBACATE
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41 East Forty-second St., New York 17, N.Y.

THE READER WRITES

Approves of New Index

To the Editor of Chemical Industries:

I want to tell you how much I like your new policy of including the index in CHEMICAL INDUSTRIES each half year.

M. C. CASSIDY, Librarian
The Harshaw Chemical Co.
Cleveland, O.

Several readers have expressed approval, none disapproval, of CI's new policy of binding volume indexes into the June and December issues instead of printing them separately as before. This is especially gratifying in view of the added expense of the new method. The index to Vol. 65, which comprises the last six months of 1949, will be found at the back of this issue.—ED.

What, No Whipped Cream?

To the Editor of Chemical Industries:

CHEMICAL INDUSTRIES did an excellent job of handling several of the papers presented by Du Pont men at the recent American Chemical Society meeting in Atlantic City. I have reference particularly to the write-up on George Seidel's paper on "Erifon" flame retardant on page 497 of your October issue and the write-up of Dr. E. F. Izard's paper on "Self-Curing Resin," on page 499.

I cannot resist the temptation, however, to razz you gently for the typographical error in the third paragraph of Mr. Greenewalt's paper. What Mr. Greenewalt actually said was this: "Should that well of venture capital dry up, our country will indeed turn into a desert," whereas your typographer had our country turning into a "dessert" instead. This matter was brought to my attention by one of our chemical directors, who told me that when this miraculous transformation took place, please make his apple pie a la mode. As for me, I'll take straight pumpkin pie.

JAMES K. HUNT
E. I. du Pont de Nemours & Co., Inc.
Wilmington, Del.

This is once CI will be glad to eat its words.—ED.

De Nora Amperage

To the Editor of Chemical Industries:

We should like to call your attention to an error in the article in your September issue entitled "Mercury-Type Chlorine Cell." The sub-heading mentions that the De Nora cell produces 880 lbs. of NaOH and 780 lbs. of chlorine per day in a 4,000 amp. cell. The 4,000 figure obviously should be 12,000.

CARLTON M. DEAN
Monsanto Chemical Co.
St. Louis, Mo.

The amperage of CI's proofreaders was a little low on that day, too.—ED.

Overtime Pay

To the Editor of Chemical Industries:

On January 25, 1950, the Fair Labor Standards Act as amended by Public Law 393 becomes effective. As everyone knows, the minimum wage then becomes 75c an hour in place of the present 40c.

It may be of interest to your readers, however, to know that the new Act also makes certain provisions with respect to overtime pay.

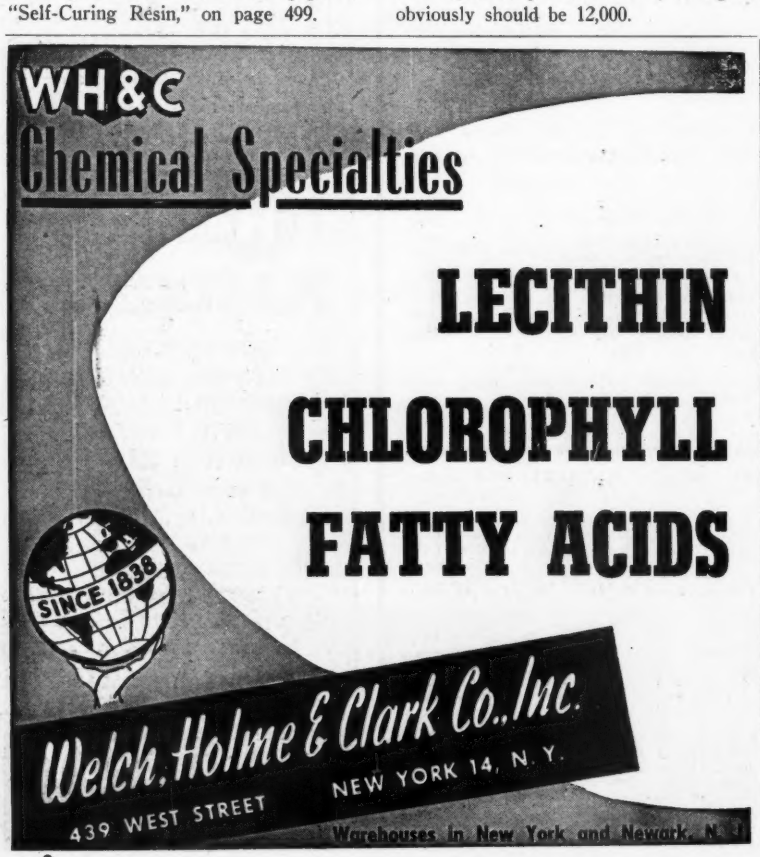
Of special interest are those that supersede the "overtime on overtime" Act, which was passed to nullify the effects of the court decisions in the longshoremen's cases. The Act provides so fas as possible, apparently, for saving employers from paying double overtime in cases similar to many that have arisen over work on a sixth or seventh day, on holidays, and other paid "no work" days. Thus payments for daily or weekly overtime in accordance with some other law or under some contract agreement of practice may be offset against any overtime due under the Fair Labor Standards Act, which accords with the Administrator's rulings heretofore.

When a premium is paid of at least 50% for work on Saturdays, Sundays, holidays, or the employes' regular day off, or on the sixth or seventh day of his work week, the payment may be credited against overtime due under the law. The same applies to any premium pay of at least 50%, under a union contract, for work done outside the normal work day or work week.

The new statute gives legal sanction to a form of contract already approved by two decisions of the U. S. Supreme Court, in which employes are guaranteed a minimum weekly wage at something less than the full-time hourly rate earnings including any overtime. However, such arrangements must be incorporated in a bona fide individual or collective bargaining contract; the stated hourly rate must not be less than the 75c legal minimum; the weekly guaranteed salary must cover a work week of not more than 60 hours (at the stated rate per hour); and the employe must receive at least time-and-a-half for anything over, in addition to his salary, and the duties of the employe must be such as to require irregular hours.

This type of arrangement is to take care of employes whose time cannot be checked, and who may put in a lot of time sometimes and not much at others. It is designed to equalize earnings from week to week.

NATHAN C. ROCKWOOD
Chicago, Ill.



Mutual's

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OTHER NAMES: Chromate of Soda.

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MOLECULAR WEIGHT: 162.00

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Chloride as Cl	0.03% max.
Sulfate as SO_4	0.60% max.

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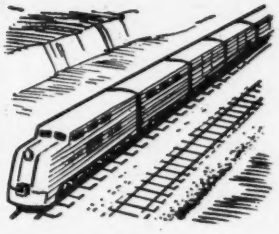
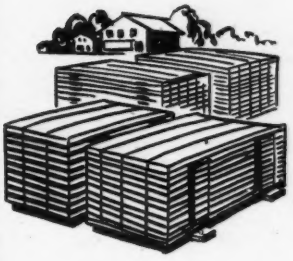
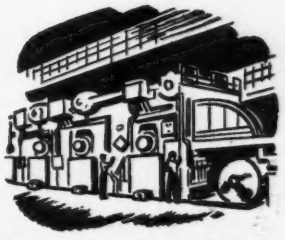


INTERNAL COMBUSTION ENGINES



LUMBER



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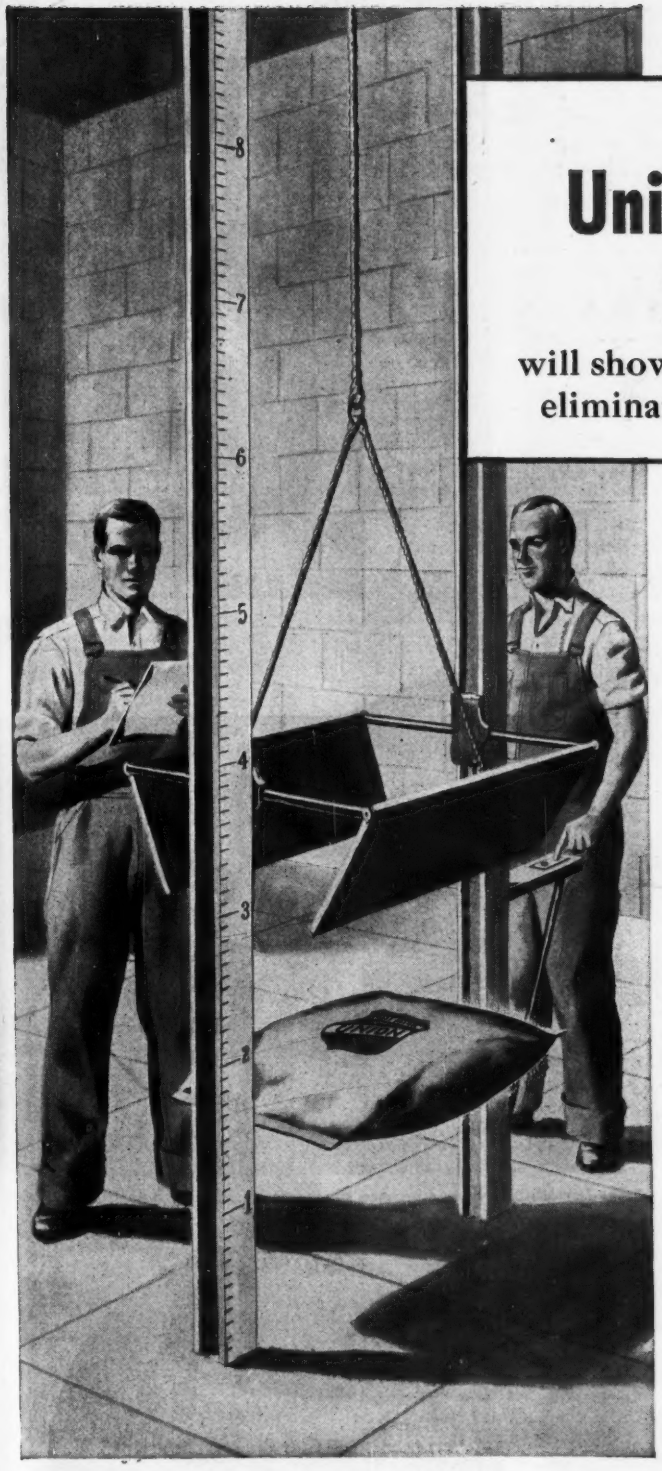

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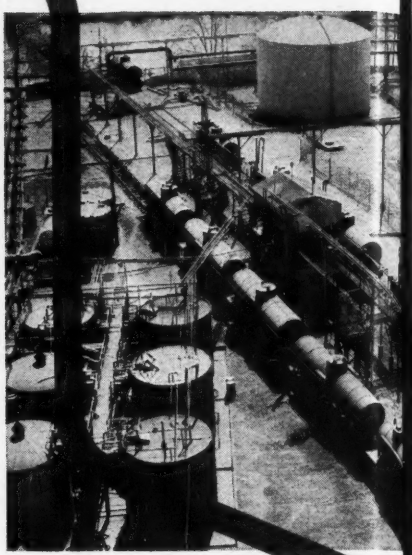

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In the organic field, Eastman Industrial Chemicals cover aliphatics, aldehydes, acids, anhydrides, esters, and alcohols. In the aromatic series are found anilides, amines, aminophenols, phenols, and phenol ethers. Eastman Industrial Chemicals also include cellulose acetate and cellulose acetate butyrate esters.

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Our Neo-Fat* fatty acids have enabled many chemists to improve their products and processes, too. For example, you no longer have to buy a mixture of fatty acids to get the one you really want. From the most complete line of fatty acids you can find anywhere, you can select pure fatty acids tailor-made to fit your exact needs. Our patented fractional distillation process also permits controlling the concentrations of any of these pure fatty acids to provide a blend that will meet any specifications.

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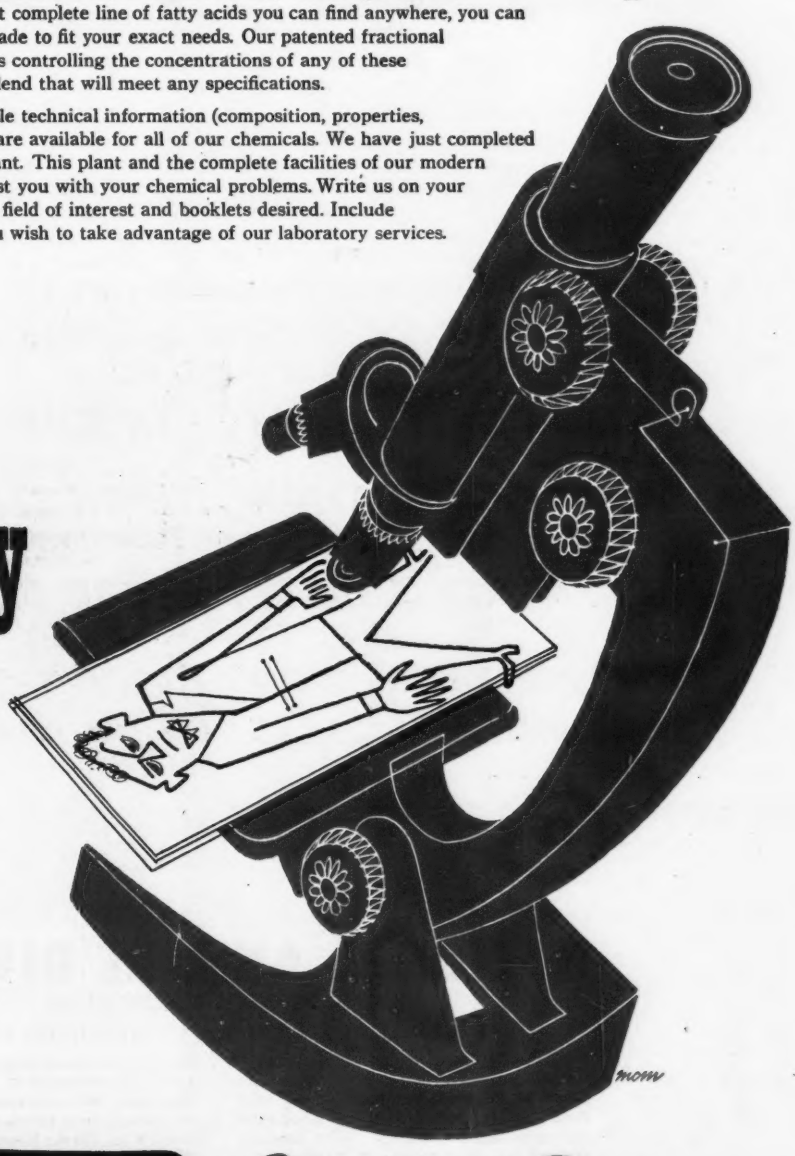
*T. M. REG. U. S. PAT. OFF.

Are you an unhappy chemist?



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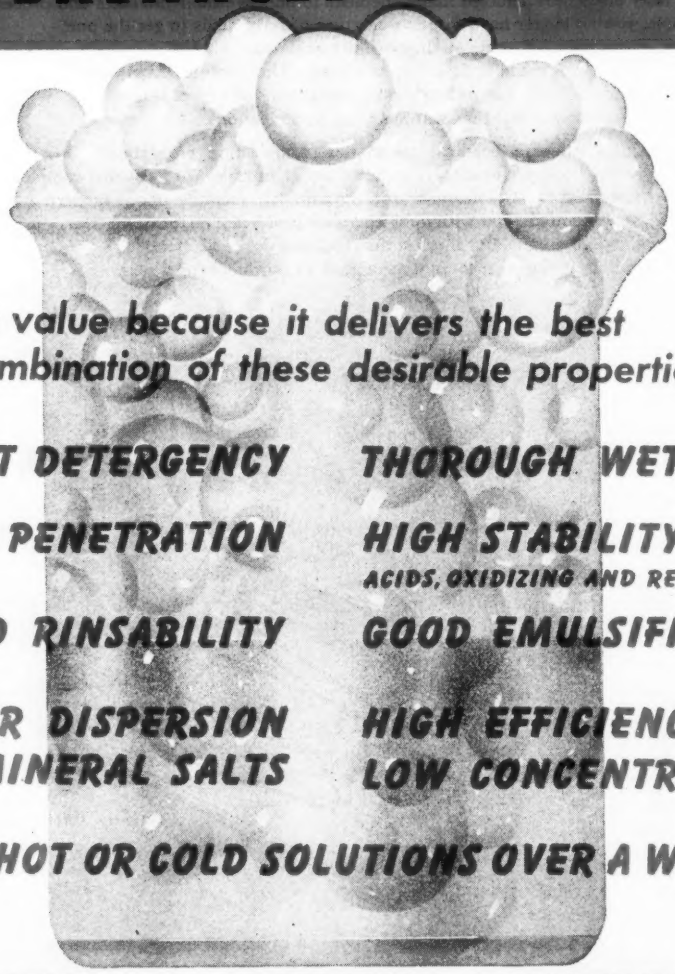

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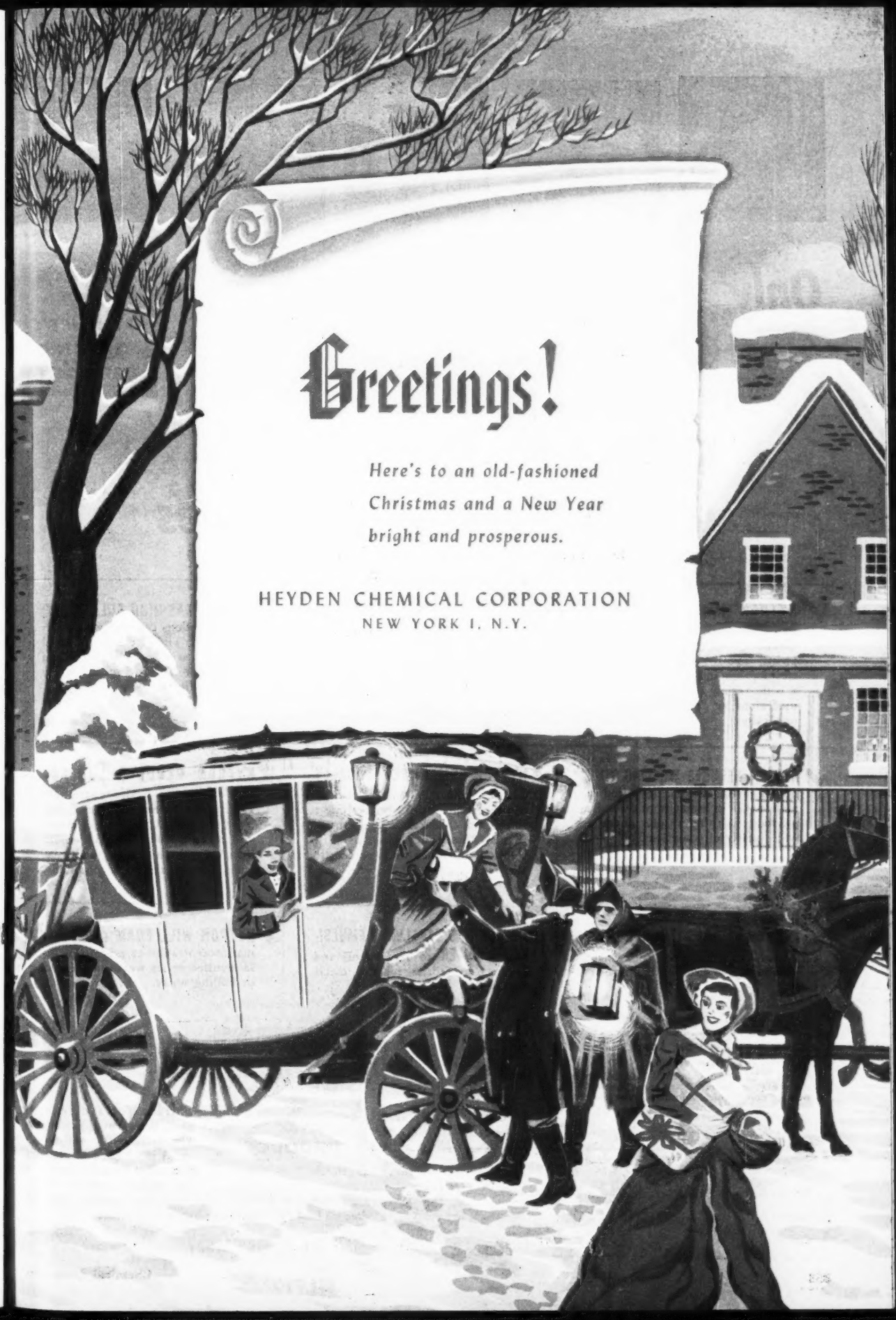
Greetings!
Here's to an old-fashioned
Christmas and a New Year
bright and prosperous.
HEYDEN CHEMICAL CORPORATION
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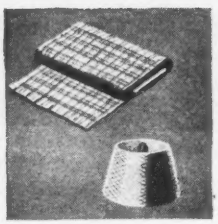

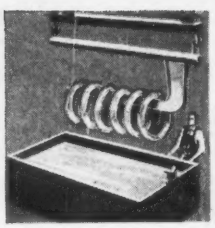
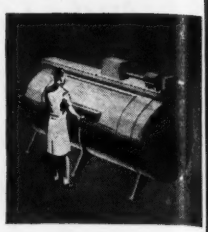

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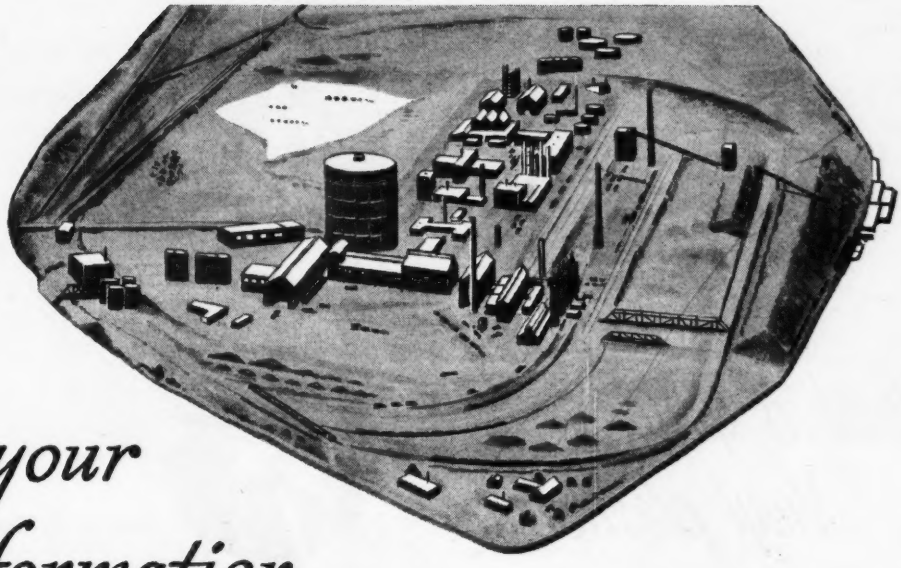

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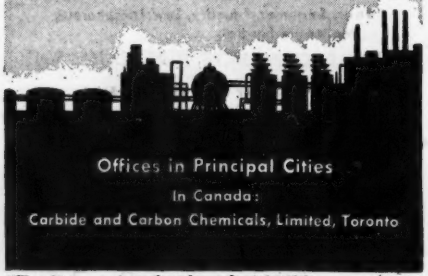

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Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter
December, 1949

For Your Information:

What is believed to be the first installation in this country of the DeNora (Italian) pressure hydrogenation process for reduction of glycerides to fatty alcohols is going into the new Long Beach, Calif., plant of Procter & Gamble Co. Equipment for the process is being imported from Italy. Start-up of the new plant is scheduled for next June. The alcohols will be used to make P&G's alcohol sulfate-type detergents, Tide and Dreft.

Solvay Process Division of Allied Chemical & Dye Corp. is sounding out the market for terminal-double-bonded olefins in the five- to twelve-carbon-atom range. These represent a co-product of the olefins made by hydrocarbon cracking for its Nytron detergent. Inquiries have been made among potential buyers of tank-car quantities.

* * CI * *

Although no public announcement has been made, Hercules Powder Co. has been making a new phthalate-type vinyl plasticizer, Hercoflex 150, since September. The alcohol is a mixture of normal octyl (two-thirds) and normal decyl (one-third) obtained by hydrogenation of cocoanut oil. Competitive in price with di-2-ethylhexyl phthalate, the new ester has better low-temperature flexibility and is less than half as volatile. It is also less volatile than straight di-n-octyl phthalate. Only hitch: Raw material supplies allow maximum production of but half a million lbs. a month, and Hercules' output is already approaching that figure.

The sensational sale of anti-histamine agents as nippers-in-the-bud of colds (they're outselling aspirin in many chain drug stores) means a relatively small but growing market for chemical intermediates. One firm alone, Anahist Co., Inc., Yonkers, N. Y., is presently turning out 6,000 gross bottles a day of Anahist, an anti-histaminic derived from dimethylaminoethanol, anisaldehyde, and 2-aminopyrimidine. That adds up to almost a ton a day (the bottles contain forty 25-mg. tablets) or over 300 tons a year.

* * CI * *

Crosby Chemicals, Inc., De Ridder, La., has spent $500,000 in plant expansion during the past year. Having embarked on the manufacture of ester gums several months ago, the firm is now in the pilot plant with maleic-

modified rosin alkyds. As a prime producer of rosin, Crosby has a good opportunity to exploit its basic position.

Rohm & Haas Co. joins the parade of chemical companies using water transportation to carry chemicals from the Southwest to Eastern markets and processing plants: The M/S Dynafuel, owned and operated by Sun Oil Co., carried a 500,000-gal. trial cargo of intermediates from Houston to Bridesburg and Bristol, Pa. Analysis of cost and other factors will determine whether such shipments will be put on a continuing basis.

* * CI * *

Commercial production of the new 70% and 97% stearic acids made by Trendex Co., Memphis, and sold through Atlas Powder Co. (this issue, p. 928) will begin shortly after the first of the year. The new process by which the high-purity acid is made is ready to move out of the pilot plant.

Commercial Solvents Corp. will soon be announcing its new nitroparaffin-base insecticide, Dilan, which is said to be the first insecticide to stop the Mexican bean beetle. It's a mixture—first developed by Henry B. Hass when he was at Purdue (CI, April 1949, p. 560)—of 1,1-bis (p-chlorophenyl)-2-nitropropane (one part) and 1,1-bis (p-chlorophenyl)-2-nitrobutane (two parts) in an emulsifiable concentrate that can be diluted with 800 or more parts of water. In addition to the bean beetle, it is effective against a wide range of potato, cabbage tomato, and other pests.

* * CI * *

Two recruits for the aerosol band-wagon: Tetco Co. Division of Industrial Management Corp., Los Angeles, is marketing its Moth-O-Blitz (containing 7% methoxychlor, 1% chlordane) and Insect-O-Spray (containing 3% DDT, 0.2% pyrethrins,1.5% piperonyl butoxide) as household items on the West Coast and in the Chicago area.

A new company to be known as American Monomer Corp. is in process of formation by a New England group with headquarters in Boston. It will concentrate on custom manufacture of specialty monomers for plastics and resin formulations.

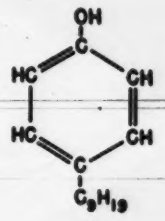
* * CI * *

Here and There:

Du Pont is now marketing monochlorotrifluoroethylene monomer. This monomer can be polymerized to give resins like M. W. Kellogg Co.'s Kel-F and Carbide and Carbon Chemicals Corp's Fluorothene....You may expect to hear more about a continuous filter operating on an entirely new principle. The cake is extruded and the liquid separated with no moving parts....Procter & Gamble is readying a new household scouring powder and a home permanent....Columbia Chemicals Division of Pittsburgh Plate Glass Co. plans to make benzene hexachloride at Natrium, W. Va., shortly after the first of the year....Shell Oil Co. is now pushing Retinax A, a lithium hydroxystearate-base, all-purpose grease which replaces the variety of greases formerly necessary in auto lubrication. A similar product, Alvania, is designed for industrial use.

The Editors

Nonyl Phenol



Newest addition to Koppers series of Alkylated Phenols

Koppers has added Nonyl Phenol to its series of alkylated phenols, and now offers it to the chemical industry in commercial quantities. Nonyl Phenol is a slightly viscous, yellow to tan liquid. It is only very slightly soluble in water, but is miscible with common organic solvents.

REACTIONS

Two of the three normally reactive nuclear positions are unsubstituted in this alkylated phenol, and are subject to reactions such as acylation, sulfonation, nitration, alkylation, and condensation with aldehydes.

The unhindered phenolic hydroxyl group undergoes such reactions as etherification, esterification, vinylation, ethylene oxide condensation, and formation of nonyl phenoxyacetic acid.

USEFUL APPLICATIONS

The physical properties of Nonyl Phenol indicate that it will be useful for the production of modified phenolic resins, non-ionic surface active-agents, lubricating oil additives, antioxidants, plasticizers and agricultural chemicals.

PHYSICAL PROPERTIES

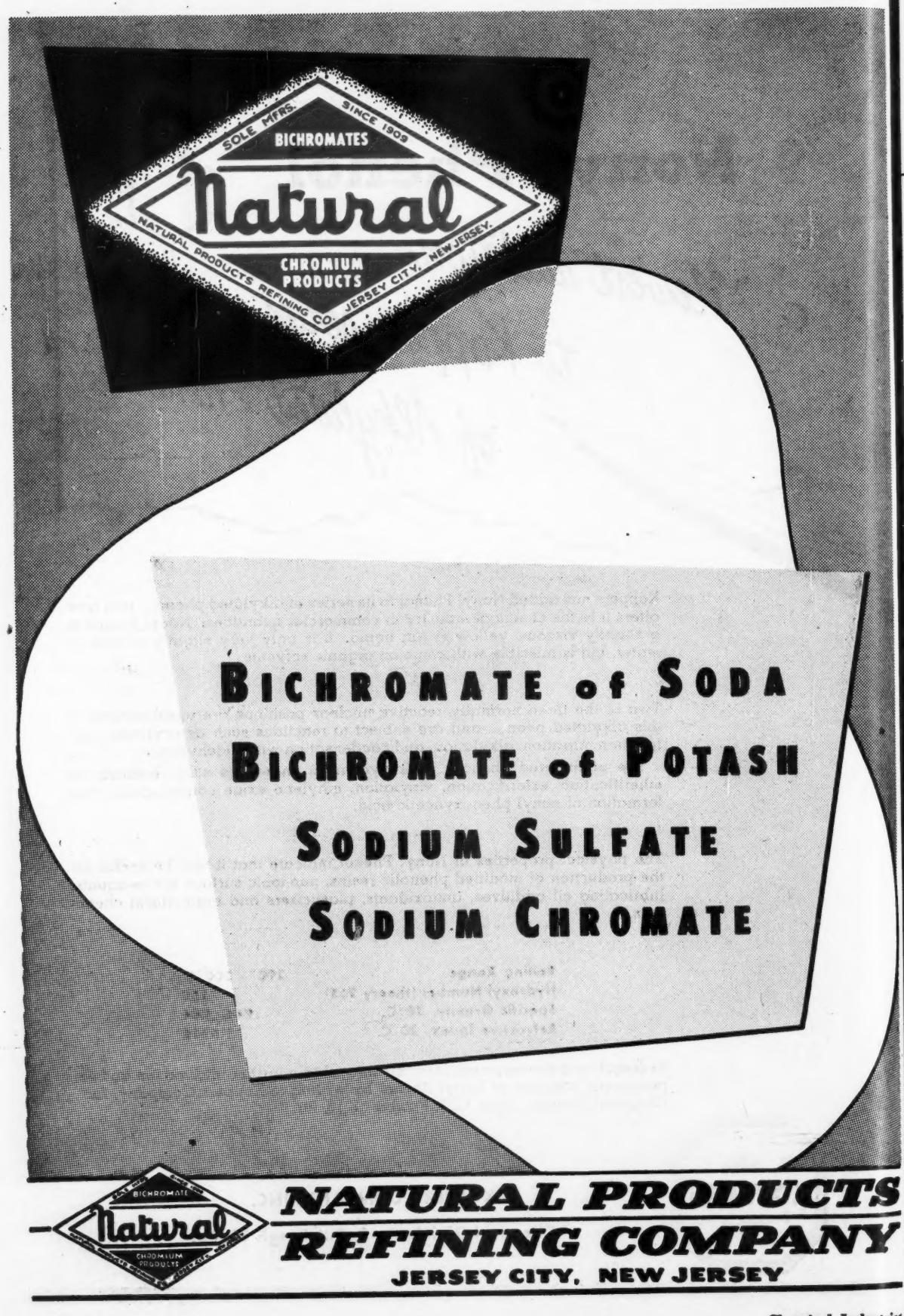
Boiling Range	**290°—300°C.**
Hydroxyl Number (theory 255)	**250**
Specific Gravity, 30°C.	**.940-.944**
Refractive Index, 20°C.	**1.5118**

Research and development chemists may obtain further information and experimental samples of Nonyl Phenol by writing to Koppers Company, Inc., Chemical Division, Dept. CI-7, Pittsburgh 19, Pa.

KOPPERS

KOPPERS COMPANY, INC.

Chemical Division • Pittsburgh 19, Pa.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RESEARCH ON THE CAMPUS

by ***ROBERT L. TAYLOR, Editor***

DESPITE TREMENDOUSLY INCREASED OUTLAYS by industry for research laboratories, equipment, and payrolls during and since the war, it is the colleges and universities that are this country's fastest growing centers of scientific research today. And Uncle Sam is the fellow who is footing most of the bill—to the tune of over $100,000,000 a year.

THIS IS THE SUBSTANCE of some unusually fine reporting this month by our esteemed contemporary, *The New York Times*. Polling the country's principal colleges and universities on the subject of their research activities, *The Times* discovered some rather significant things:

- The Federal Government will give some 200 institutions more than $100,000,000 for research purposes during the current academic year; industry will contribute another $25,000,000.
- Both Government- and industry-sponsored campus research has increased nearly five-fold since 1942. (Research expenditures by industry generally are estimated to have approximately tripled over the same period.)
- There seems to be no clearly defined basis on which Federal research grants are made. Charges of "influence" and "patronage" are already creeping in. Smaller institutions feel that the "big time" schools are getting more than their share. The University of Michigan, for example, will receive $5,000,000 of Federal research money this year, as against $13,386 eight years ago. Columbia University will receive $3,336,000.
- Some schools mentioned a tendency on the part of the military to emphasize "gadget research" in their contracts as contrasted to basic investigations.
- So far, Federal research contracts have been extremely free of "strings" and of control within the general limits and objectives of the projects.

FROM THESE FACTS AND FIGURES compiled by *The Times*, two conclusions are quite evident which have not been generally recognized before:

First, of this country's total research—basic and applied—the share that is being carried out in the schools as against private industrial laboratories is assuming increasingly significant proportions.

Second, through the providing of funds for much of this research, the Federal Government is fast becoming a major source of financial support for the total activities of some of our institutions of higher learning.

It is too early to say whether these things are good or bad for the country. But certainly as members of an industry whose continued progress is so dependent both on research and on the products of higher education, we have a very real stake in the outcome.

The Times survey raises some basic and fundamental questions.

Can colleges continue to receive increasing research support from Washington and still maintain their academic freedom? The problem—or a similar one—has been solved at the State level. Will it be as easily solved at the Federal level, where many colleges are competing for the same support? Will research grants to colleges become a new form of patronage?

Can colleges and teachers carry out their principal function of education as effectively when 25 to 50 per cent of their activities are concerned with research?

As needs of Federal agencies become more specific, and as more industries seek the advantages of university research, is there danger of a wholesale shift in the emphasis of academic research from basic to applied problems? The urgent need for more basic research has been voiced many times. Will the colleges be able to provide it if their total research load is too great?

EDUCATORS ARE ALREADY AWARE of the problems and their deeper implications that are represented in these questions. Whether they can meet them successfully and still retain the advantages and benefits of a broader participation in the research effort of the nation remains to be seen. Industry—and the chemical industry in particular as a major user of research—will do well to keep watch on the situation and also conduct its own research relationships with the colleges in the light of the real fundamentals involved.

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Coefficient of Expansion (20°C to 30°C):
0.0008 per 1°C
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Distillation range at 3 mm of Mercury:
194°C to 310°C
Heat Stability:
No apparent decomposition on distillation to 430°C at atmospheric pressure
Solidification Point:
36°C, approx.
Surface Tension of Saturated Aqueous Solution:
Less than 35 dynes/cm
Interfacial Tension Against Water of a 1% Solution in Mineral Oil:
1 to 2 dynes/cm
Flash Point, Cleveland Open Cup:
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Water
Less than 0.002% by weight
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What's new

RETAIL SPECIALTIES: Extra dollars by the gallon.

PROFITS IN PINT PACKAGES

Basic chemical producers eye retail specialties field for bigger profits, broader markets that smart merchandising can win.

CHEMICAL SPECIALTIES have always been a profitable outlet for basic chemicals. Many companies have successfully engaged in one phase of this business—supplying industrial specialties in bulk to the textile finishing, tanning, electroplating, rubber processing, and other industries.

The other phase—small-packaged items for the retail trade—is a different kind of animal, and major chemical producers have generally been leery of it.

They have been happy to sell basic raw materials to formulators like Boyle-Midway, Inc., R. M. Hollingshead (Glass Wax), and S. C. Johnson & Son, who know the psychology of selling a pint of something to a housewife. Some chemical producers, however, have made a go of selling specialty numbers formulated largely from their own chemicals; and this month many who previously eschewed such ventures have pint packages on the agenda as they sit down to plan for next year.

Longing Eyes

It is not hard to see why some organizations are taking a second look at the small-package business. Profits on many basic chemicals have shrunk, and the higher return from the same chemicals sold as retail items seems like one way to improve an annual report. Another consideration is that such specialties may represent an additional market for chemicals for which present industrial demand is less than productive capacity.

Retail selling, however, is a business foreign to men used to shipping carloads of chemicals to long-established customers, and the size of the advertising budget for a successful floor wax would be incomprehensible to them. Yet some companies have learned to play that kind of ball, or have gone out and hired the right kind of players before they entered this "minor" league.

Old Hand and a Big One

The label of the Du Pont Co. is probably better known than that of any other chemical company. That's partly because it has been on retail shelves since 1917, when the company got into the paint business. "Duco" Household Cement, one of its first specialties, was developed after the discovery of "Duco" nitrocellulose lacquer in 1923. That was followed by the "No. 7" line of automotive and household specialties which includes such items as a cooling system sealer, acid and rust inhibitor, cleaner, wax, chrome and metal polish, tire dressing, rug and upholstery cleaner, dry cleaning fluid, Pro-Tek hand cream, etc. This line is now a separate section of the Fabrics and Finishes Department.

The company's "Zerone" and "Zerex" anti-freezes are produced at the Belle, W. Va. plant by the Polychemicals Department. (This department also has a plant at Leominster, Mass., which makes combs and toothbrushes sold with the Du Pont label.)

Although the Grasselli Chemicals Department has produced agricultural chemicals for years, only since the past war has it established a retail products section which distributes home and garden products. Principal products are Du Pont Rose Dust, Du Pont Floral Dust, Du Pont Lawn Weed Killer and "Ammate" Weed Killer.

Eighty-eight per cent of Du Pont's products are sold to other manufacturers, for processing, and information is not available on how much of the remaining 12% reaches the consumer with the Du Pont label. It is clearly no small enterprise.

Anti-Freeze, Oils

Another large company with a natural interest in the specialties business is Carbide and Carbon Chemicals Corp., whose glycol is sold for anti-freeze by its affiliate, National Carbon Co., under the trade mark Prestone. The same unit has been test-marketing Ucon materials as Prestone Motor Oil in upper New York State and Virginia for two or three years.

Carbide itself has been marketing its "G-12" insect repellent (ethylhexanediol) at retail, as well as its "Synasol" solvent (alcohol type solvent) for general household use, and Pyrofax gas (essentially propane) for fuel. Its line of "Crag" fungicides (for dollar spot on turf, potato blight, and apple scab and cherry blight) also goes to the retail trade.

The aerosol bomb is partly responsible for the entry of another big chemical producer, General Chemical Division of the Allied Chemical & Dye Corp., into this field only this year (*CI, May, 1949, p. 740*). While it had previously marketed home garden insecticides under the Mechling trade name, its two new aerosols, Airex Mothproofer and Airex Insect Killer, are reaching a wider consuming

public. Not only does this line promote and provide an outlet for General's new propellents, the Genetrons, but it enables the company to sell more of its basic chemicals as new aerosols are added. An Airex Air Freshener, for example, will be shipped soon.

Among other Allied divisions, only National Aniline Division has any interest in specialties. It has only one product, the alkyl aryl sulfonate detergent Swerl, which it packages for distribution by the B. T. Babbitt Co.

Growing Line

Substantial additions have been made to the large stake Commercial Solvents Corp. has in the consumer business. This year five new products (carburetor cleaner, car wash, degreaser, penetrating oil, automatic windshield fluid) went into its Nor'Way line of automotive specialties, which already included radiator anti-rust, cleaner, quick flush and stop leak. Distribution of its two anti-freezes —Nor'Way, the methanol type, and Peak, ethylene glycol type—has been broadened. It also sells two proprietary alcohol-type solvents under the trade names Shellacol and Quakersol for home as well as industrial use.

Another important factor in the anti-freeze business is U. S. Industrial Chemicals, Inc., which markets its own non-permanent type, Super-Pyro, and a permanent type, and packages as well for the private label trade. Its "PIB" is a well-known compound for waterproofing automotive ignition systems.

This automotive specialties business has naturally been attractive to petroleum companies because they can market the products at service stations, and because many such products are derived from petroleum itself. Esso Standard sells anti-freeze, rust preventives, and the like. (It is also a factor in the insecticide business, its Flit being a familiar trade name.) Shell Oil Co. not only has a complete line of retail auto specialties, but it also markets such items as furniture polish, spot remover, insecticides, floor wax, and livestock spray—all under its label. A year ago, The Texas Co., taking advantage both of the distributional setup of its Texaco dealers and its joint ownership with American Cyanamid Co. of the Jefferson Chemical Co. (ethylene glycol producers), entered the anti-freeze business on a national basis with its Texaco PT.

Specialties a Specialty

A company that immediately suggests specialties is the Pennsylvania Salt Manufacturing Co. For the last 20 years it has been paying ever-increasing heed to this facet of its business which today represents about forty per cent of its sales. All of this is not in the retail category, however, although consumer products have shared in sales promotion and gains. Pennsalt's B-K and Household Products Department handles distribution of such items which include Lewis Lye, Knox-Out line of insecticides, B-K hypochlorite bactericides, and General Manual Kleanser. This year sales of this department will comprise a substantial amount of the company's total sales, and will represent more than a 60 per cent increase over retail specialty sales of two decades ago.

Wyandotte Chemicals Corp. is another company heavy in the specialty cleaner and germicide field through its J. B. Ford Sales Division. Although many of these are small-packaged, they are not retail items, but are sold to farmers, hotels and restaurants whose accounts may be too small to use drums or who need such sizes to control use of the materials. The company's Dural H is a laboratory glassware cleaner sold through laboratory supply houses.

Like Wyandotte, not all companies are interested in retail sales. American Cyanamid Co. and The Dow Chemical Co. are two good examples. Cyanamid's Agricultural Chemicals Division markets only Cyanogas for ants and Cyanogas A-Dust for rodents, moles, etc., in small packages, while the Calco Chemical Division has only Bleachette laundry bluing, a household product acquired years ago. Dow started small-packaging its agricultural chemicals under its own label when it began to sell fruit growers, and these items have grown in number to round out the line and to accommodate the trade. Yet its primary interest is in bulk selling. Similarly, although its subsidiary, Cliffs Dow, sells Sentinel anti-freeze, its heavy chemical division doesn't intend to promote anti-freeze as such from its glycol production.

Industry Prop

The naval stores industry, on the other hand, has depended upon small packages to sell much of its turpentine since the 1920's, and this movement is on the increase. Hercules Powder Co. was one of the first to go to individual packages and promote such merchandising. The cans and bottles of Newport Industries' and Crosby Chemical Co.'s turpentine can be found on retail shelves. Moreover, Crosby just started distributing pine oil in 16-ounce bottles this year, and intends to promote this business.

A number of companies have just one or two items in the retail specialty category. Some of them are relatively unimportant in overall company operation; others are given considerable promotion and are lucrative enterprises. All add up to a sizable amount of business.

General Aniline & Film Corp. has devoted considerable promotion effort to its two retail synthetic detergents—Glim, a liquid for dishwashing, and Chad, for use in automatic dishwashers. Recently the B. T. Babbitt Co. took over the distribution of Glim, but the basic producer is still handling Chad.

Mathieson Chemical Corp. is another with just two products. Its HTH 15 (powdered hypochlorite used as a dry chlorine inhalant for poultry) and Lo-Bax (disinfectant and fungicide) are sold through retail feed stores.

Nopco Chemical Co. is almost exclusively in the industrial field, but through its wholly-owned subsidiary, Admiracion Laboratories, it packages some of its shampoos in small bottles for drug store sale, and in gallons for the beauty parlor trade.

Koppers Co., Inc.'s retail marketing of paradichlorbenzene, naphthalene and naphthalene-cedar mixtures as moth preventives is estimated to have accounted for somewhat more than ½ of 1% of its net sales in 1948. All the containers bear the Koppers shield, but some are trade marked "Para" and others "White Tar," a holdover from the White Tar Co., which Koppers purchased in 1929.

An interesting specialty for a chemical company to bring to retail consumers is the flavor accentuator, monosodium glutamate, which International Minerals & Chemical Corp. has placed in over 15,000 stores as Ac'cent, and which A. E. Staley markets as Zest. Also in the food field is the one specialty Charles Pfizer & Co., Inc., markets under its own label, an ascorbic-citric acid-lactose tablet to prevent browning of frozen or cut fruit.

Another new product that is the only one its manufacturer sells in small packages is B. F. Goodrich Chemical Co.'s deer repellent, Good-rite z.i.p. (*CI, May 1949, p. 744*), which is sold in one, five and fifty-five gallons to distributors.

Not Only the Size

Not all manufacturers have met with instant (or eventual) success in expanding into retail products. This can be attributed partly to a lack of understanding that there is more to the game than putting into little containers the same thing they sold in carlots.

A large insecticide producer can't merely package a good formulation of DDT, list on the label the insects it will kill and expect to meet with success. He has to depend upon a clerk—not an entomologist—to sell his product, and he has to give him a package that will mean something to a customer with a bug to kill.

The home and garden insecticide line of Sherwin-Williams Co. is a good ex-

ample of how a company with long experience in the consumer field (house paints) markets its products. Some of the descriptive and catchy product names are Bug Blaster Sr., Bug Blaster Jr., Fruit Spray, Weed-No-More, Poison Ivy Killer, Snail Killer, Vegetation Killer, Lawn Insect Killer, Red Spider and Mite Killer, Cucumber and Melon Dust, Dry Lime-Sulphur, 10% DDT Powder, 6% Liquid Coating DDT, Aphid Killer and Roach, Ant and Spider Killer. So that the dealer won't have to become an entomologist to recommend these products, the company has prepared a handy, simplified full-color bug chart for his customer to hang in the tool shed or garage. The large, full-color illustrations of insects help the consumer to readily identify the pests attacking his plants. Sherwin-Williams also supplies dealers with such aids as attractive garden supply window displays and an illuminized wire counter arch where they may group all their insecticides and small-package garden supplies together on one counter. The customers can pick their killers themselves without waiting for the clerk.

This house and garden insecticide market is not easy to sell and hold, and Sherwin-Williams itself did not find the initial going too smooth. This type of aggressive merchandising through its established retail outlets, however, should win it a fair share of this growing business. Such an approach can give any basic producer an even chance to succeed with any small-packaged specialty.

ATTRITION REPLICA

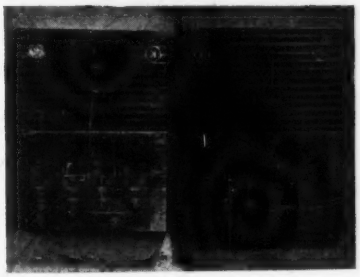
Polyester casting resin used by Bureau of Ships to record surface wear on machine parts.

MILITARY - CIVILIAN cooperation, embodied by John Alfers of the Bureau of Ships, U. S. Navy, and Irving Muskat, Marco Chemicals, Inc., solved the problem of reproducing evidence of wear down to millionths of an inch—and in a permanent, three-dimensional form. The recording of hills and valleys on the surface of machine parts can be accomplished by this method in a few minutes time with plastics that do not require the use of any weighing, measuring, heating or pressurizing equipment.

Old Technique, New Materials

Impressions of surfaces to produce negative replicas of finishes and wear patterns have been employed for many years. Materials used include plaster of Paris, wax, low-melting alloys, sulphur-graphite mixture, and resins, including both thermosetting and thermoplastic.

Plaster of Paris and sulphur-graphite replicas are considered good; but extreme care is necessary to prevent damage during normal handling or shipping. Wax impressions produce general indications of surface conditions but they are easily damaged. Low-melting alloys have been used for recording surface defects, but they are not considered equal to other materials.



REPLICA (left) of roughness comparator plate (right).

These methods all fail to yield a relatively rigid three-dimensional reproduction that can be handled and explored with surface measuring instruments such as the profilometer or Brush analyzer.

The new method developed by the Bureau of Ships for recording surface finish and wear patterns utilizes a free-flowing polyester resin. This resin hardens in 10-20 minutes after the addition of a catalyst, without application of external heat or pressure. The impression is formed by casting the resin-catalyst mixture on the surface to be recorded. The casting may be removed for study after cooling.

Polyester Used

The plastic, a polyester resin, is obtainable in preweighed quantities. A two-component kit contains resin in one unit, with filler added, and catalyst in the other compartment. There has been some uncertainty as to the shelf life of this two-component material; so now three-component kit with resin, filler, and catalyst in separate sections is available. The two-component mix is prepared for casting by thoroughly stirring the catalyst with the resin; with the three-component package, the filler is mixed with resin and then catalyst is added. In casting, use of elaborate equipment and strict adherence to minute details are not required.

This method shows many advantages:

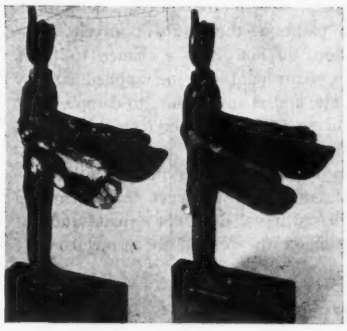
1. Accuracy of the negative reproduction is well within that of existing measuring instruments.
2. The impression is durable—its surface may be tested with a profilometer or Brush analyzer.

CHEMOTHERAPY

BRONZE DISEASE is the latest "illness" to succumb to chemistry, but the cure will cause no stir in medical circles. It is a pathological condition found only in ancient bronze objects from Egypt and other countries of antiquity, but for years it has plagued museum curators. The antique bronzes have been subject to a corrosion which is first noticed when the bronze figure breaks out with a green, cancerous-looking rash on one or more parts of the figure. It continues to grow into a hard, thick crust so massive that recognition of the figure is impossible.

Dr. Sarah Freeman, curator of fine arts at Johns Hopkins, and Dr. Alsoph Corwin, professor of chemistry, worked together on the cure of bronze disease, opined that it is often induced by an object's being handled by a person whose moist hand has the proper salt content to start chemical action on the surface of the bronze object.

This theory was proved to be correct. The disintegration is caused by an electrolytic process. They reasoned that if the disintegration was electrolytic, the disease could be cured and the bronzes could be restored by an electrolytic process in reverse. (*See before-and-after illustrations above.*)



The "cure" for bronze disease effected at Johns Hopkins is brought about in a large, square glass jar filled with caustic solution. The bronze object is immersed and made the cathode. A strip of sheet iron is also immersed and made the anode. Electric current is passed through, and in the process performs a chemical change in the bronze object which reverses the process of corrosion. The electric current detaches the crustation from the bronze and dissolves it in the caustic, as well as stopping the progress of the disease.

3. Equipment required to use the resin consists of scotch tape (for "retaining walls") and a stirring rod.
4. External heat and pressure are not required.
5. Very little time is needed.
6. Inexperienced personnel can produce good results with very little instruction.
7. Relatively inaccessible areas can be recorded and studied.

Experience with this method has shown it to be entirely satisfactory for use in indicating general wear patterns and recording surface finishes with extreme accuracy. Profilometer measurements of a surface roughness comparator plate and of a plastic impression of this plate indicated a variation in surface finish (microinches root mean square) of 0.9 in the range 2.9 to 17.4, and of 4.0 in the range 33.0 to 70.3.

SOLVENTLESS SPRAY

A hot-melt, sprayable protective coating will be made here by Swedish firm.

THE BREG bridge at Hufingen, Germany, was painted 13 years ago with a new type of coating developed by a German inventor, August Pahl. Today the bridge surfaces are still reported fresh and bright, and almost completely free of rust spots. The lock gates of the Albert Canal, in Belgium, were similarly painted two years later, and they, too, are still in excellent condition.

Armed with that kind of sales ammunition two Swedes, Holger Boldemann and Sten Jeurling, came over here last month to make manufacturing and distributing arrangements in this country for the product they took over in 1936. Boldemann, a banker, and Jeurling, a technical man, formed a Stockholm chemical firm, Antros, A.-B., in the '30s to manufacture and market plastic-impregnated wood. Shortly thereafter they became interested in Pahl's product, undertook further development and improvement and gave it a portmanteau trade name, Antropahl.

The coating is presently being used by the Swedish Navy (*CI Newsletter, Nov. 1949*) and is being adopted rapidly by many industries. Its backers hope that it will find a ready market in this country in structural steelwork, in petroleum, railway, marine, chemical and other industries.

No Solvent

The Antropahl system employs paint made of resins, oils and waxes, and contains no solvent. When cold, the mixture forms a tough waxy mass. The paint is melted in the Antropahl spray gun by electric resistance and sprayed through a flame so that the mixture bonds intimately with the surface, forming a coating which hardens immediately. Jeurling was responsible for developing the Antropahl spray-gun from its original design of 50-square-foot capacity to its present one of 350 square feet per hour.

Since the Antropahl paints are hard at room temperature and are melted by heat instead of made liquid by solvents, raw materials can be used which have high

STEN JEURLING: High wages are his ally.

rust-preventive qualities but cannot be dissolved in organic solvents.

Pores, which often develop with ordinary paints as the result of solvent evaporation, do not have a chance to form. Also, Antropahl can be applied in any climate, and at any season, to damp or wet surfaces; the gun's acetylene flame dries the receiving surface as the mixture is applied. If the paint is mechanically damaged and chips, the rust that forms on the bared metal does not expand and extend under the rest of the protected surface.

Labor Saving

Antros hopes to find an ally in the high cost of painting labor. The all-weather applicability of Antropahl makes it possible to schedule painting throughout the year, eliminates overtime on bright, sunny days. Also, only one coat is necessary—and it lasts for a long, long time. Another advantage from the employer's standpoint is the absence of toxicity hazards: Antropahl's ingredients are harmless.

The new coating and marine work appear to be made for each other. Paints now in use, including hot asphalt, need a dry surface and hot dry weather for their application; Antropahl reduces servicing and drydrocking schedules to a minimum.

It has been tested on ships in northern waters and shown to replace the initial coating (usually red lead), the anti-corrosive coating and the anti-fouling coating. Tests are now under way on its performance in southern waters. It has thus far outlasted all other paints heretofore used under the water line on ships.

Resists Chemicals

As for the waterworks and chemicals industries, Antropahl is now being used on a water conduit in Sweden and it has been tested to withstand acids, ammonia and their resultant gases, indicating its practicability for chemical plants and tanks.

Cost of the paint? In general, says Jeurling, it is not more expensive than the average anti-corrosion painting, while cost of labor and long-range maintenance are cut from one-third to one-half.

TELLING HIM HOW

Company prepares manual for carriers transporting its hazardous material.

CHEMICAL MANUFACTURERS realize that they have to make truck drivers treat their hazardous products with as much respect as they themselves do in the plant. How to do it is a difficult question, and one which, if unanswered, can have serious implications for the industry (*CI, September, 1949, p. 337*).

The Parlin, New Jersey, plant of Hercules Powder Co. has come up with a simple and effective means of education in the form of a short, clearly-written guide for the safe handling and transportation of its product, nitrocellulose, by motor carrier. A brief foreword explains what the material is, where it goes, how large quantities of it have been safely handled and used, why the company has compiled the booklet outlining best current practice in handling this product, and what federal, state and local bodies have regulatory control over it.

What Every Driver . . .

In the pamphlet proper, all questions that the driver and his employer should consider are discussed briefly and clearly, yet comprehensively. It tells what kind of truck should be used and the condition it must be in; it outlines the necessary safety equipment, driver requirements; says who or what cannot be carried on the road, during loading, in the plant. Operating requirements contain such information as how close to a building a truck should be parked and a caution to the driver to see that a consignee doesn't bounce a barrel in unloading his truck. Tire maintenance requirements, and

stopping and parking requirements are set forth clearly.

Short but complete instructions are given on emergency parking and stopping, what to do if there is an accident, or if a fire breaks out on the truck. Instructions tell when and how to travel on the Pennsylvania Turnpike, point out that travel through such tunnels as the Holland and Lincoln Tunnels, or on ferries, is prohibited, and advise against movement on Saturdays, Sundays and holidays.

In 1943, Hercules brought out a similar handbook designed mainly for its own vehicle drivers. The present one, however, is for the use of common carriers carrying its flammable products. The company feels that educating the carriers it has selected is its principal job in controlling the hazard in transporting its products. Its way of going about this task is a good example for the industry.

TEFLON FOR TANKS

Teflon suspensions in water permit spray coating of process equipment.

CURRENTLY used corrosion-resistant coatings and alloys are in for some mansize competition from Teflon, now that it can be applied more simply and economically than before..

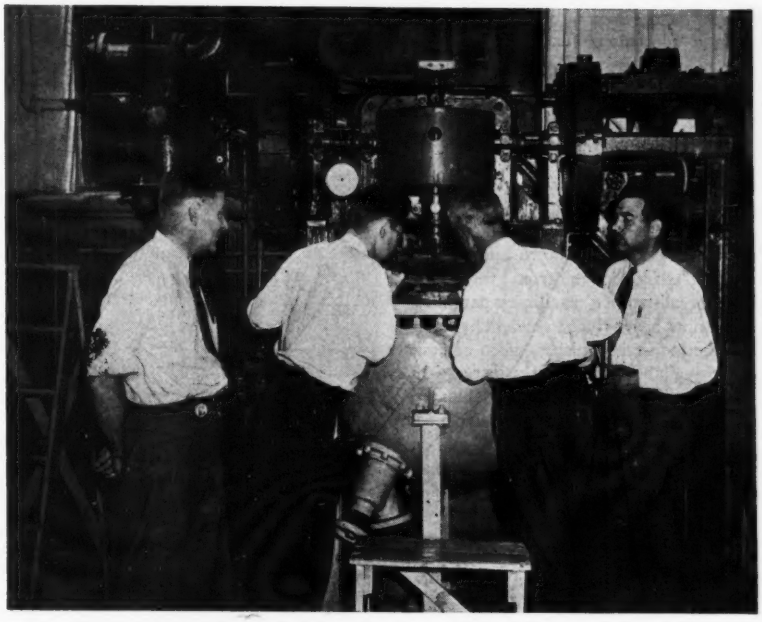
The extraordinary resistance of Teflon tetrafluoroethylene polymer to heat and practically all chemicals (except molten alkali metals) is well known (*CI, May, 1946, p. 781*). Equally well known is its high cost and difficulty of fabrication into useful forms. The latter obstacle has been surmounted by development of sprayable Teflon suspensions, and the former doesn't loom so large. Although the price ($10 per pound) is high, relatively thin coatings are used.

Small Particles

Du Pont's Polychemicals Department started out by making Teflon polymer into granules. These could be made into sheets, rods, tubes, and tape, but it wasn't easy. Then the chemists realized that as the particles were made smaller and smaller, processing became easier and easier. The final product, obtained only recently, is of such small particle size that suspensions in liquids can be stored for considerable lengths of time with little or no settling. The suspensions, containing from 35 to 65% solids, look like milk or cream.

Spray Finishes

There are three types of Teflon spray-coating: primer, intermediate, and finish. The process for applying each is similar.



PROCESS KETTLE: Easier to coat as the particles get smaller.

Before spraying the primer, it is necessary to clean the metal surface, washing off grease with a solvent and, preferably, sand blasting to assure the best possible adhesion. After spraying, the coating is air-dried, or force-dried at temperatures below 200° F. to drive off the carrying water. The metal is then heated, either by baking in an oven or by spot-heating, until the temperature is brought to around 750° F. At this point, the tiny particles of solid Teflon turn to a gel and fuse together, giving a continuous film. As the metal cools, the film becomes solid.

If thin spots are found, or damage occurs after use, the finish can be patched by cleaning down to the metal, applying more spray finish, and fusing with blow torch or gas flame. Repairs can be made in 15 to 20 minutes.

Teflon finishes will adhere to many metals, such as steel, stainless steel, aluminum, nickel (and alloys), and to glass (after sand-blasting), porcelain, and brick.

The total thickness of Teflon finishes necessary to give protection against corrosion depends upon the nature of the chemical to which the finishes are to be exposed. In general, four to six coats will suffice, a primer about 0.3 mil thick and intermediate and finish coats of a mil each, the total having approximately the thickness of a dollar bill. For ultimate protection against the more corrosive chemicals, a greater margin of safety can be obtained by building up a heavier film. Suitable tests, however, should be applied to assure freedom from pinholes and cracks before the equipment is used.

Laboratory experience indicates that Teflon finishes possess a moderately high degree of resistance to wear. Their capacity to withstand sudden changes in temperature is indicated by the fact that, in the laboratory, finishes fused at around 750° F. were actually toughened when cooled by quenching with water. After the carrying liquid has been driven off, the finishes have the chemical and heat resistance and, for many purposes, the electrical insulating properties of Teflon in other forms.

A similar application method can be expected soon for Kel-F (polytrifluorochloroethylene). M. W. Kellogg is now testing Kel-F dispersions on its own equipment, will release sofe data next month. Kellogg thinks that the physical characteristics of Kel-F are such that superior coatings may be made from it.

Chemical Process Equipment

Indicated uses for the spray finishes are coatings for chemical pipes and fittings, for agitators and rupture disks in chemical process vessels, and laboratory benches and hoods. Electrical properties of the finishes may be utilized for insulation of electrolytic equipment.

Among the manufacturers working closely with DuPont in the present period of evolution of Teflon linings is The Pflaudler Co., Rochester, N. Y. Engineers and chemists at Pflaudler point out that there are striking similarities in methods of application of Teflon and glass linings: Both require careful surface preparation; both are applied as water suspensions in

several coats, each of which is fused to form a continuous film; and when the equipment in question must handle highly corrosive solutions or vapors, the fused lining must be subjected to rigid tests to insure freedom from imperfections.

Other industrial applications for Teflon have turned to advantage the extreme difficulty encountered in making it stick to anything. The baking industry, for example, has to slow down operations to remove stuck dough from rollers and other bread-making machinery parts. Teflon is now being used to end the sticking, and the industrial finishes, when commercially available, will greatly increase this use. Similar sticking problems may be overcome by Teflon finishes on machinery used to heat-seal plastic films, and experiments are being made with the material as an anti-sticking coating for rubber and polythene plastic molds.

The spray finishes currently cost $65-$85 a gallon, depending on the solids content. One gallon will cover about 300 sq. ft. with a one-mil coat.

Wire Coatings

Wire enamels, at $75-$110 a gallon, are applied by dipping. Special applicators can be easily attached to standard wire-coating machines, and production up to 50 feet a minute can be achieved. Although such insulation is expensive, its use may pay off where space- and weight-saving—as in aircraft—are important.

Extrusion compounds of Teflon resin have been developed for heavier insulation than is possible with the wire enamels. Coatings ranging in thickness from 5 to 20 mils have been applied to wire, in the laboratory, by use of a ram extruder at a rate of 20 feet a minute. The wire passes through the center of the piston and the compound is forced through a small orifice around the wire which then moves into a heated chamber where the liquid is evaporated and the resin particles fused at 700° F. into a tough, homogeneous coating.

The heavier coatings have exceptional dielectric properties at high frequencies and, for this reason, are expected to be adopted widely for radar and television installations.

Fabrics and Films

Glass fabrics coated with Teflon, and unsupported Teflon film, will complement the wire enamels and extrusion coatings in electrical equipment, and also will have non-electrical applications. The coated fabrics may be used in the electrical industry as slot liners, coil wrapping, layer insulation, and, possibly, as a substitute for mica sheet in transformers and condensers. In the chemical industry, the fabrics may be used in the manufacture of protective clothing, or as gaskets, conveyor belts, and ducts for hot, corrosive gases.

In effect, the coated fabrics are simply Teflon sheets reinforced with glass cloth, and these may be laminated into strong, solid material of almost any desired thickness by bonding under heat and pressure.

One of the uses for unsupported Teflon film and coated fabric is as electrical tapes superior to those now available commercially. They may be employed for wrapping electric coils, or as protective layers between coils, or as condenser films.

SCREEN TEST

IBM screening of chemical compounds results in several promising research leads.

CHEMICAL and biological codes developed by Dr. W. R. Kirner, of the National Research Council's Chemical-Biological Coordination Center, enable

W. R. KIRNER: Letters and numbers will tell.

chemical structures and biological actions to be represented by linear letters and/or numerals. These, in turn, can be placed on punched cards and handled by available IBM equipment.

50,000 Data Sheets

Data sheets have been designed on which are recorded the chemical-biological information appearing in the scientific literature and accumulating from the Center's screening program. At the present time about 50,000 data sheets are in the files and the data on them are rapidly being coded and the coded data placed on punched cards. The facilities for handling punched cards include nine machines and four operators.

The biological data are being coded by a general biological code which merely segregates the biological actions into broad categories. They are also being coded by means of a detailed vertebrate pharmacology code so that the machines can assist in answering certain detailed questions when necessary. Detailed codes in other biological fields are in process of developments, e.g., for plant-growth regulators, fungicides, entomology, bacteriology and chemotherapy.

The Center is routinely taking these data from over 150 selected scientific periodicals starting with 1946. An analysis has indicated that by extending the number of selected journals to 250 the coverage of chemical-biological literature will be about 90 per cent complete (excluding Slavic languages). This will be done as rapidly as possible. The literature prior to 1946 will have to be processed as time permits.

Laboratories Cooperate

There are now 32 laboratories cooperating with the Center's screening program. Chemicals can be tested as insecticides, insect repellents, rodenticides, bactericides, fungicides, plant-growth regulators, and chemotherapeutic agents for cancer, malaria, tuberculosis and other diseases. About 2,000 compounds have been distributed to the screening agencies and it is planned to continue this distribution at the rate of 100 compounds per month. Since the Fall of 1947, 2,300 biological reports on 650 compounds have been received. These reports are currently being obtained at the rate of 50 per month.

As a result of the screening program several promising research leads have been discovered. Actidione, an antibiotic submitted by the Upjohn Co., has been found to control mildew growth on certain plants. A rubber chemical submitted by U. S. Rubber Co. has been shown to have considerable promise as a rodent repellent. Two other compounds, Dow's and Monsanto's, have been found effective in controlling chiggers. Another compound has given exceedingly interesting results in controlling the European corn borer. An additional twenty-five compounds have plant-growth regulating activity comparable to that of 2,4-D.

In the very near future the Center will initiate the distribution of so-called "Summary Tables of Screening Data" which will be available to interested investigators.

Reviews Published

The Center has published a review by Dr. R. L. Metcalf entitled "The Mechanism of Action of Organic Insecticides." About 3,000 copies have been distributed. A second review by Dr. M. B. Chenoweth entitled "Fluoroacetic Acid and Re-

lated Compounds" will be ready for distribution this month. Two reviews concerned with rodenticides and rodent repellents are presently being considered for publication.

The Center now has a staff of over thirty of which about twenty are scientists. In addition, it employs about fifteen abstractors who prepare data sheets from assigned journals. Funds for the support of the Center continue to be supplied by the Department of the Army (Chemical Corps, Corps of Engineers, Quartermaster Corps, Surgeon General's Office), Department of the Navy (Office of Naval Research—Division of Medical Sciences), American Cancer Society and the National Cancer Institute.

OXYGEN DIVINER

Unique magnetic susceptibility of oxygen permits rapid analysis and recording by entirely new principle.

IN THE fall of 1940 America eyed apprehensively the drift of Europe's war clouds westward across the Atlantic. The chemistry division of the National Defense Research Committee, meeting in Washington, was informed that the Navy needed a portable instrument for use on oxygen breathing equipment for measuring and indicating the partial pressure of oxygen in a mixture of gases. Known chemical methods of analyzing for oxygen were too slow and involved bulky equipment.

Among those present at this meeting was Linus Pauling, head of the department of chemistry at California Institute of Technology. Pauling thought about the problem for several days, put to himself the question, "What physical property of oxygen distinguishes it sharply from other common gases?" He concluded that it was magnetic susceptibility, and proceeded to devise a measuring instrument that utilized this principle.

LINUS PAULING: The distinction was there.

Nine Years After

Last month, almost nine years later to the day, and after the Pauling magnetic oxygen meter had performed vital service in a variety of military and hospital applications, a commercial adaptation of the instrument became generally available for laboratory and process control work in industry. Maker of the new industrial machines is Arnold O. Beckman, Inc., Pasadena, California. A. O. Beckman, president of the company, is an old Pauling friend and admirer, handled development and production of the original Pauling instrument during the war.

The Beckman oxygen analyzers and recorders, as the new industrial instruments are called, so far surpass conventional chemical methods of analysis in speed, accuracy and convenience that they can be considered an entirely new tool in the kit of the analyst and process control engineer. They provide direct and rapid measurement and can be used wherever the oxygen content of a gas must be measured or must be maintained within narrow limits.

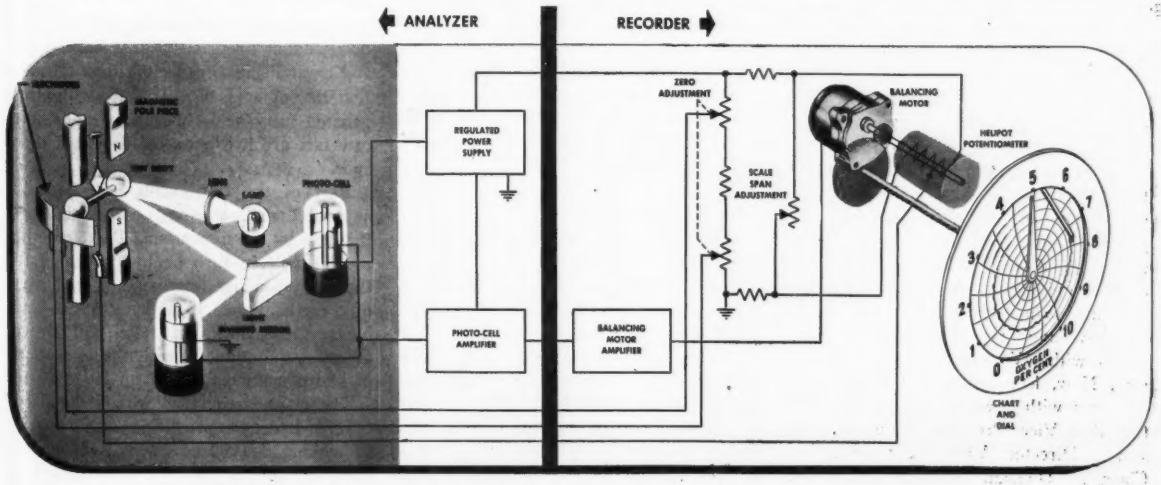
Magnetic Principle

Measurement is based on the fact that oxygen is unique among gases in being strongly paramagnetic (attracted to a magnet), whereas other common gases, with a few exceptions, are slightly diamagnetic (repelled by a magnet). This magnetic property of oxygen is so great that it is possible to determine in gaseous mixtures oxygen concentrations of only a few parts per million by measuring the magnetic susceptibility of the gas.

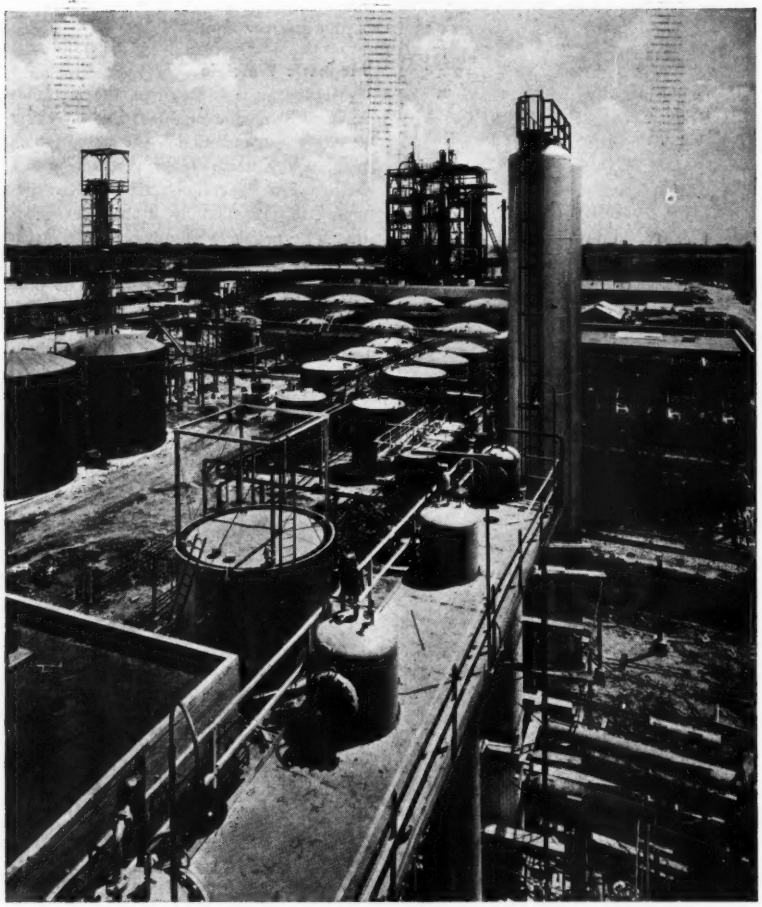
The manner in which this is done is shown at the extreme left of the illustration below. A dumbbell-shaped test body consisting of two small hollow glass spheres is supported on a quartz fiber between two pairs of magnetic pole pieces. The amount of oxygen in the surrounding sample gas is measured by the change in magnetic force acting on the test body.

The Pauling oxygen meter was limited to the *indication* of oxygen partial pressure in the sample gas. In the Beckman laboratories, continued development of the magnetic analyzers has produced an electrostatic-magnetic design in which changes in oxygen partial pressure are translated into equivalent changes in DC voltage. This permits the oxygen content of a gas to be recorded directly on a conventional recording potentiometer (*see below, right*).

The Beckman analyzers are available in both portable and panel-mounted models, the former about the size of an electric toaster, the latter somewhat larger. The instruments cover the entire range of oxygen concentrations from a few parts per million to 100% oxygen. High accuracy at any concentration can be achieved by appropriate selection of scale range.



RECORDING MAGNETIC OXYGEN ANALYZER: A new principle for analyzing gases.



ARMOUR AT McCOOK: 100,000,000 lbs. a year of chemicals from fats.

CHEMICAL INDUSTRY BASED ON FATS

With completion of a multi-million-dollar fat derivatives plant at McCook, Ill., Armour & Co. pins big hopes on a chemical industry based on fats.

ALMOST exactly 20 years ago E. L. Lalumier, vice president and secretary of the big meat packing house of Armour & Co., did a radical thing. He hired an organic chemist. Calling the new employee into his office one morning he said, "Conquest, we want to see if you can find something new to make out of fats. We don't care what it is—golf balls, maybe, or something like that—anything, just as long as it isn't soap and isn't edible. This country has an oversupply of fats, and we can make the best edible fats and soap tallow in the world and still have more fats than we know what to do with. We need something brand new. Now, let's see what you can do."

It was with a warm glow of satisfaction that Vice President Lalumier, Research Director Victor Conquest, and Chemical Division Manager Hoyt M. Corley watched a sleek new multi-million-dollar Armour fatty acids and derivatives plant come on stream last month at McCook, Ill., about 12 miles from Chicago's loop. Although golf balls were not among them, the plant was ready to turn out in tonnage quantities some score of products that met Vice President Lalumier's 1929 stipulations.

Chemicals from Fats

Designed to process up to 100,000,000 lbs. a year of raw fats and oils, the plant will make glycerine, fatty acids, and a variety of fatty-acid-derived amides, nitriles, amines, amine acetates and quaternary ammonium salts. Most will be no different from those Armour has been making in the chemical plant it erected at its soap works on West 31st St., Chicago, some eight years ago. But at McCook they will pour forth in considerably increased quantities. The new facilities represent just about double the company's previous capacity for fatty acids and about a six-fold increase in derivatives. The Chicago plant processed about 35,000,000 lbs. of raw fats and oils during the past twelve months.

McCook will, however, make one product that has not heretofore been available from any commercial source. That is pure (90-95%) linoleic acid. This fatty acid, which differs from oleic acid only in the degree of saturation of its molecule (linoleic has two double bonds, oleic one), cannot be separated from oleic, with which it always occurs in nature, by distillation. To do the job Armour has developed a low-temperature fractional crystallization method which is based on Texas Co. patents for the solvent dewaxing of petroleum. Commercially pure oleic has formerly been produced by solvent extraction (the Emersol process) and as red oil by pressing of animal fats.

Price of the pure linoleic will probably be in the range of linseed fatty acids, which is about 19 to 20 cents a pound. The material is said to form an excellent alkyd resin which dries rapidly to a hard clear film that does not darken on aging.

Plant and Processing

The McCook plant is typical of the trend to outdoor construction in chemical plants, even in northern climates. Enclosures are confined principally to service and control centers. The plant has been so laid out that capacity can be doubled without changing the basic plan simply by duplicating units.

Raw animal and vegetable fats are brought into the plant and split into glycerine and fatty acids in a Colgate type continuous high-pressure splitter (*CI, April, 1947, p. 592*). The acids are separated and purified by distillation where possible and also by crystallization as mentioned above.

Fatty acid distillation capacity of the new plant is about 60,000,000 lbs. a year, and crystallization capacity 15 to 20 million lbs. of acids a year. When hydrogenated fatty acids are being made, the raw fats are hydrogenated first and then split.

Part of the fatty acids will be sold as such, part converted to amides and nitriles by ammoniation. Part of the nitriles will in turn be hydrogenated to the corresponding fatty amines, and part of these converted to amine acetates and quaternary ammonium salts. All operations are continuous with the exception of hydrogenation.

The plant is equipped with a standard Girdler hydrogen-producing unit capable of making 300,000 cu. ft. of hydrogen a day. Nitrogen is used for blanketing the contents of tanks and blowing out lines

to prevent oxidation. The plant makes its own nitrogen by burning natural gas under controlled conditions.

The Future

In waste fats, Armour feels that it has a rich storehouse of cheap organic raw material, from which—technologically at least—can be made almost any of the C_8 through C_{20} organic chemicals. As long as we remain a nation of meat eaters we will have fats whether we want them

VICTOR CONQUEST: Golf balls to go.

or not. It is thus neither surprising nor illogical that Messrs. Corley, Conquest and other Armourites should tend to look at McCook not merely as a chemical plant but as the cornerstone of a new organic chemical industry based on fats.

ATOMIC BOUNDARY

RADIOACTIVE isotopes are now being used to mark the boundary between two products flowing through the same pipeline. The indicator is added just after one crude oil, for example, has passed through the line and just as the next crude is being introduced. Many miles farther along the detection of radiation on the outside of the pipe will indicate the location of the boundary.

This application is particularly useful when it is necessary to transport crude oils of more than one type in a main line and tap them off into tributaries leading to different sections of a refinery, for it greatly reduces wastage. In the past it has been customary, when introducing a high-grade product into a line previously used for a lower-grade material, to flush several thousand barrels of the higher grade to a lower stage of the refinery in order to avoid mixing of the two crudes. With the radioactive signal, the boundary is more sharply defined and the costly flushing operation is unnecessary.

MORE ALLYL STARCH

Starch-derived lacquer resin takes forward step as General Mills ups output, lowers price.

ALLYL STARCH had five candles on its birthday cake last month. And just about the same time General Mills let it be known (*CI Newsletter, Nov. 1949*) that this chemurgic lacquer resin is being made in drum quantities and sold at prices competitive with orange shellac and under that of white shellac.

Before November, 1944, when the Eastern Regional Research Laboratory of the U. S. Department of Agriculture announced that allyl starch had been made and appeared to be a useful material, the product was only an idea. An old idea, to be sure, for an inferior forerunner was synthesized as early as 1923. It wasn't until 1942, however—after Shell Oil Co. had made allyl chloride available—that the Department of Agriculture took the project up in earnest.

General Mills Takes Over

At the time of its introduction allyl starch was described (*CI Nov. 1944, p. 762*) as "a new type resinous coating material that looks like varnish, withstands high temperatures and the action of most chemicals and solvents . . . is easily applied, and possesses such desirable characteristics as transparency, high gloss, hardness, and adequate flexibility." The Laboratory sent out hundreds of allyl starch-coated panels—one to General Mills, whose organic researcher, J. Robert Roach had independently synthesized a similar product.

ERRL's product looked better and cheaper to make, so Roach took on the job of perfecting it for commercial production. It got to the pilot plant in 1947, and out of 200 firms that were told about the product and shown samples, 140 wanted more for further study.

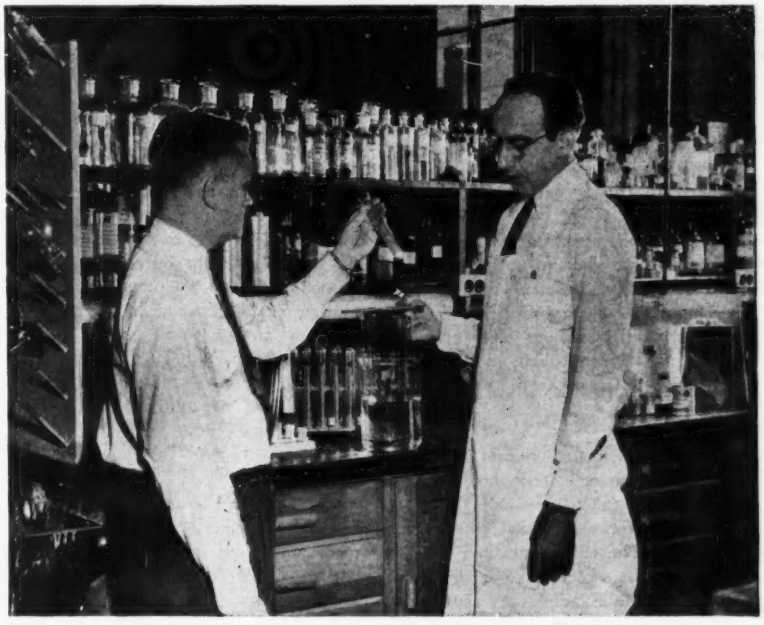
Evaluation Necessary

But while a lot of people were interested, few were willing to undertake the research necessary to adapt the product to their specific needs. Back to the laboratory it went—this time to emerge in compounded form, readily adaptable to users' requirements.

Something to Offer

As in many previous battles of synthetic vs. natural, allyl starch has the advantage of uniformity. Natural lac varies in quality—depending presumably on how the insect *Laccifer Lacca* was feeling that day. Also, allyl starch doesn't require low-temperature storage, isn't tacky, and retains its adhesiveness in the presence of water and other solvents.

General Mills is now selling a considerable number of drums each month as a replacement for shellac in certain adhesives, and to manufacturers of aniline inks. (The product is used in inks for printing on glassine and PT cellophane, where it seems to do a better job than competitive formulations.) Right now emphasis is being placed on furniture finishes—with good promise of success from present indications, says M. H.



J. ROBERT ROACH (right): On a fifth birthday, cause for cogitation.

Baker, head of Chemical Field Application, and it looks as if it is about ready to be used as a "finishing varnish" on metal cans.

Even the present reduced prices are experimental. When allyl starch hits big-time commercial production, General Mills believes it will give a lot of commonly used resins something to cogitate about.

TANK-GROWN SOUP

Tank-culture methods similar to antibiotic fermentation give mushroom-flavored product.

NO PROWLING in dark woods or groping in dark cellars are involved in making a new, chemically-processed mushroom soup.

Submerged mushroom cultures developed by Dr. Harry Humfeld, of the U. S. Department of Agriculture's Regional Laboratory at Albany, Calif., yield a creamy material which may be frozen, canned as a slurry, or, after centrifuging, canned as a cake. The taste can be controlled to give either a fine mushroom flavor or a bland tasteless yeast substitute for use when the taste of yeast is objectionable. The process is based upon the discovery that the spawn of certain strains of edible mushrooms will grow into cobwebby filaments (mycelia) in an aerated agitated liquid culture.

Similar investigations have been carried out over the past three years at Boyce-Thompson Institute for Plant Research, Yonkers, N. Y., by Dr. Josef Szuecs, whose work in Hungary before the war earned him a world-wide reputation in the fields of mushroom culture and deep fermentation.

His mushroom-like product is similar, but it consists of granular particles, the flavor of which can be controlled within narrow limits. His researches have led to a couple of patent applications—but no commercialization as yet. A pilot plant is now in operation.

Nutrient and culture variables have been studied at Albany under a project supported by the Research and Marketing Act of 1946. Purpose of the study is to determine conditions for optimum growth and flavor which are necessary for commercial adoption of the process.

Made from Waste

While the fermentation rate is slower, the yields approach those obtained for baker's yeast: about one-half pound of dry product for each pound of sugar or equivalent. The culture medium may be prepared from several low-priced or waste materials. Examples are asparagus-butt juice, pear-waste juice, and a rice bran extract. A synthetic medium may

HARRY HUMFELD: Soup from aerated wastes.

be employed containing a suitable carbohydrate, inorganic salts and various sources of nitrogen such as alfalfa press juice, monosodium glutamate, peptone, a mixture of amino acids, urea, and ammonium hydroxide. With urea as the source of nitrogen several carbohydrates have given good yields. The first harvest from the fermenter is in four to five days, subsequent harvests in two to three days.

The mycelium thus produced resembles baker's yeast in consistency and appearance, but when cooked it has a typical mushroom flavor. The flavor contributed by the substrate is important and is negligible only with synthetic media. The optimum flavor develops only after full growth, while an early harvest yields the tasteless bland product.

Many Flavors

Two strains of the ordinary mushroom of commerce, a white strain and a brown strain, yield submerged mushroom culture having particularly pleasing but readily distinguishable flavors. These flavors, like many others, are multiple. One strain has a marked nutlike flavor in addition to that of mushrooms. The flavors appear to be fully retained in the canned product. The amounts of thiamine, riboflavin, and nicotinic acid in the mycelium appear to be similar to those found in conventionally grown mushrooms or in baker's yeast. (Mycelia of other strains of mushrooms have also been grown successfully, but without the typical mushroom or other pleasing flavor.)

This process has attracted great interest from companies desiring to supplement mushroom soup stocks and sauces with mycelia for enhancement of the mushroom flavor of their products.

Apparently these are the first products to be produced microbiologically with fully acceptable flavor when used substantially undiluted as a foodstuff. The bland products may be used to supply vitamins of the B complex to persons who object to the more pronounced flavor of yeast. The process may be useful in situations in which torula yeast propagation has been used—that is, for the conversion of carbohydrate to protein in tropical countries or under wartime conditions; and it offers the possibility of producing mushroom-flavored mycelia at a substantially lower cost than that of commercially grown mushrooms.

Other Possibilities

A commercial concern operating a leased Government-owned alcohol plant in Muscatine, Iowa, is producing mushroom cultures by this method on a semi-industrial basis to further investigate costs of large-scale operation. Several other companies have obtained information on the method, and a few are considering commercial application. It is quite possible that the submerged culture process may offer industrial-scale application to an extensive group of organisms and may include production of enzymes, solvents, antibiotic agents and substances of pharmaceutical significance.

FLUIDIZED WOOD

Fluidized carbonization of redwood and other agricultural wastes may provide needed carbon, chemicals.

TAKE THREE seemingly unrelated facts—sawdust, localized industrial carbon shortages, and the relatively new fluidized solids techniques—and stir them together in the heads of Stanford Research Institute's Paul M. Cook, Lawrence M. Richards, and Ralph A. Krause, and out comes a pilot plant to produce carbon and chemicals from waste redwood.

The Key

Fluidization has been extensively developed, as is well known, during the last ten years by the petroleum industry for the more efficient catalytic cracking of petroleum.

The fluidized bed possesses a number of specific properties advantageous to chemical processes: Owing to the vigorous motion of the solid particles in the bed, a high rate of heat exchange is possible between the solids and fluidizing medium. Uniform temperatures throughout the bed are maintained by the thorough agitation. Intimate contact is obtained between fluid and solid, and therefore equilibrium conditions are rapidly approached. Immediate removal of gases

and controlled residence time for the solids are desirable characteristics for many processes. Other advantages: continuous operation, low mechanical energy requirements, simple equipment construction, ease of operation control, and simplicity of transportation of solids.

The Lock

One of the promising potential applications of fluidization is the carbonization of waste lumber products. A critical shortage of some types of industrial carbon is developing in some parts of the world, and carbonization is one of the most promising methods of converting wood wastes into a series of valuable products, such as charcoal and chemicals.

The characteristics of a fluidized bed make fluidization particularly suitable for carbonization of sawdust and other wood wastes.

In the conventional process for carbonizing hard wood, logs are charged into a retort and heated for as long as 30 hours. Because of local overheating and the long residence time of the gases, the wood chemicals are partially decomposed and polymerized, forming complex mixtures which are very difficult to separate and are of little or no value.

The Stanford researchers have recently completed a series of exploratory carbonization tests on kiln-dry redwood sawdust. Redwood was selected to make these tests since this wood contains large quantities of valuable phenolic chemicals:

> Anhydrous tars (the figures are per cent of ovendry wood), 10; crude phenols (part of anhydrous tars), 4; the phenols break down into carbolic oil, 1; cresylic oil, 1; and cresote oil, 1.2; pitch residue, 5; acetic acid, 1; methanol, 1; gas, 15.

In addition, large quantities of redwood wastes are available in the Pacific Coast area, where a carbon shortage exists.

The Treasure

The results of this exploratory program indicate the practicability of a fluidized carbonization process. Sawdust of proper particle size distribution can be successfully fluidized. A high-quality charcoal was obtained which appears to be suitable for many industrial carbon uses. Preliminary tests on briquetting the chars were satisfactory.

The process for the fluidized carbonization of redwood sawdust appears economically sound. Sawdust and other redwood wastes have only a limited value as a fuel and therefore are cheap raw materials for the process. The demand for charcoal is substantial on the West Coast of the United States and will increase rapidly as more of it becomes available and as the more expensive forms of carbon are replaced. High yields of phenolic chemicals produced in the process will find ready markets. The gas products of the reaction provide the heat necessary for the endothermic reaction, and the excess can be utilized for pre-drying the sawdust; therefore, no additional heat is required for the reaction.

Pilot Plant Under Way

Because of the technical and economic promise the process has shown, Stanford Research Institute is proceeding with the construction of a pilot plant specifically designed to determine plant-design data, possible improvements in the process, and the over-all commercial feasibility. A system is also being developed for the immediate fractionation of the chemicals obtained into their major components.

The application of this process, not only to wood, but also to other carbon-containing agricultural wastes, may well provide the basis of a new industry for the production of carbon and chemicals, and may assist in the development of the industrial potential of agricultural regions.

PAUL M. COOK: A key, a lock, a treasure.

TD for "PD"?

Addition of chelated 2,4 pentanedione to gasoline provides sales stimulus.

MOTOR Chemical Co.'s new combustion catalyst, "PD" (*CI, Sept. 1949, p. 331*), appears to have scored a touchdown on its first play—a test marketing campaign. Selling at the same price as regular gasoline, Republic Oil and Refining Co.'s "PD" gasoline enjoyed a 75% increase in sales. Part of this increase came from new customers and part (about 35%) was attributed to those changing over from premium-grade fuel in the test area.

"PD" additive is a chelate mixture, 80% cobalt acetylacetonate and 20% chromium acetylacetonate dissolved in benzene or toluene, and it can be added to leaded or unleaded gasoline. Produced by Union Carbide and Carbon Corp., chelation is accomplished by metal forming a stable ring compound via linkage through the two ketone groups in 2,4 pentanedione (acetylacetone).

How Does It Work?

"PD" is said to act by forming a deposit of metallic combustion catalyst on the internal surface of the cylinders and pistons. Not only does this catalyst prevent carbon deposits, but all previously deposited carbon is burned off. Thus the octane requirement of the gasoline is held at a constant value, permitting a finer adjustment of the fuel-air ratio. Although there is no change in the octane number of the fuel, this finer adjustment is believed to produce a slight increase in mileage. But, the most important function of this new additive is to prevent any increase in compression ratio, caused by the carbon deposits on the inside of the cylinder, and the consequent need for premium gasoline for most efficient operation.

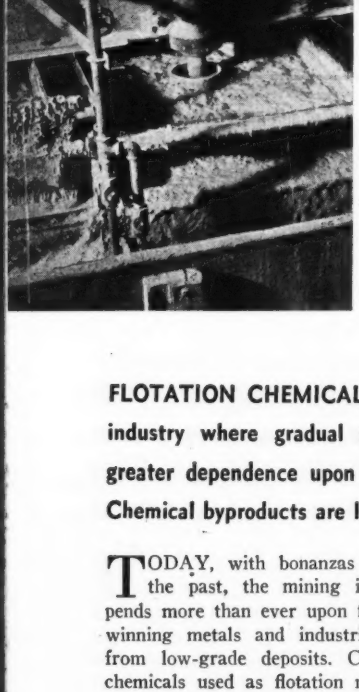
Early Days

"PD"-type additives, originated from the early work of Willard E. Lyons, which started as far back as 1918. Lyons' successor was Leo Corp. and, almost, but not quite, E. I. du Pont de Nemours & Co., whose option to purchase the patents lapsed in 1941. Motor Chemical Co., an affiliate of National Cylinder Gas Co., is the present marketing group for "PD."

"PD" can be used as an additive to fuel oils also, to improve their burning characteristics, and it is understood that "PD-F" is being used for this purpose overseas. In any event, the cost of the additive is such that its use, if any, will be limited to special purpose fuels.

If the test marketing continues to be successful, there are two questions which immediately arise: Where will the cobalt come from? and, Can "PD" gasoline continue to sell at regular gasoline prices? Cobalt will be in short supply if any large-scale use should develop, but it is believed that other metals can be substituted.

The second question reveals an almost impossible situation. The present cost of adding "PD," somewhat over 0.6 cents per gallon, would seem to make it necessary for "PD" gasoline to sell at a price above that of regular gasoline, although not as high as the so-called premium fuel. If "PD" gasoline cannot be marketed at regular gasoline prices all bets are off until another test-marketing is completed at the new higher-cost figure.



FLOTATION REAGENTS
Markets Grow As Rich Ores Dwindle

by PAUL M. AMBROSE[1] and FRANK D. LAMB[2]

FLOTATION CHEMICALS are finding a growing market in the mining industry where gradual depletion of domestic high-grade ores forces greater dependence upon flotation for recovery of metals and minerals. Chemical byproducts are likely reagent sources, since cost must be low.

TODAY, with bonanzas a thing of the past, the mining industry depends more than ever upon flotation for winning metals and industrial minerals from low-grade deposits. Consequently, chemicals used as flotation reagents, already responsible for much of the increase in total annual U. S. mineral production, are finding a growing market in this field.

New discoveries of ore deposits are largely those bodies of ore that were passed over by early prospectors as too low-grade for profitable mining. Older mines that have exhausted or nearly exhausted their reserves of high-grade ore are now turning to lower-grade material that was left in place during earlier operations. For these ores to be used, a treatment process is required that is low in cost and has a high capacity, as large tonnages must be handled and the production of valuable mineral per ton of ore treated is extremely low. Flotation meets these requirements in many instances and is depended upon to a large extent by the mining industry for future production of important raw materials.

This increased emphasis on flotation also poses two challenges to the chemical industry: Supply of flotation reagents must be increased if flotation is to expand as rapidly as it has in the past; and new reagents must be developed at a low enough cost to permit their use in such applications.

GROWTH OF FLOTATION

The flotation process, as applied to mineral dressing, dates back to the ancient Greeks who, according to Herodotus, recovered gold from the mud of a lake by means of feathers dipped in pitch and held in the hands of Greek virgins. More modern recognition of flotation phenomena was first recorded by William Haynes, who obtained a British patent in 1860 on a process for separating metal sulfides from an ore by mixing the ore with a fatty or oily agent and then agitating the mixture in water, whereby the sulfides—together with the oil or fat—were separated from the waste material. In 1885, Everson obtained a United States patent very similar to that of Haynes but improved the process by modifying the water with inorganic acids, acid salts, or neutral salts and introduced air by agitation to promote flotation of metal sulfides and oxides.

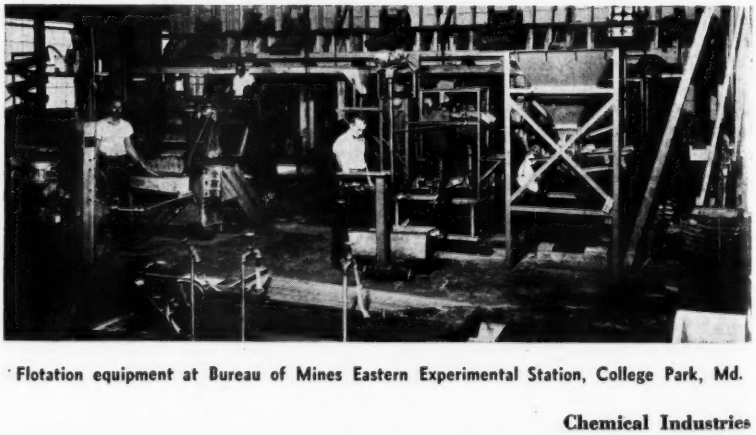
Subsequent progress in the art of flotation came slowly until about 1924, when Keller patented the use of xanthate for collecting the desired minerals in a froth. With this discovery, flotation came into common usage and was instrumental in the development of many of the large, low-grade porphyry-copper deposits of the west and other base-metal sulfide.

Discoveries of new reagents and improvements in equipment have been continuous over the past 25 years; and, while the methods for accomplishing the separation of many minerals are still unknown, it can now be said that any two minerals can be separated by flotation if one contains a substantial amount of a cation or anion that is absent in the other. This is the basis upon which all flotation separations are now carried out, even though suitable reagents and conditions are not yet known for all mineral combinations. Any sulfide mineral may be separated from the usual gangue minerals by the use of xanthates with a frothing agent such as pine oil. In some cases where a concentrate containing two or more sulfide minerals is permissible, these are the only reagents employed.

However, in most instances it is desirable to separate from each other the various sulfide minerals contained in an ore to produce high-grade concentrates of each mineral. For example, an ore containing copper, lead, and zinc sulfides could be treated selectively and three concentrates produced. In this case a bulk concentrate containing the copper and lead sulfides might be floated, first using a xanthate as collector and zinc sulfate and sodium cyanide to prevent flotation of the zinc mineral, sphalerite. The sphalerite could then be activated with copper sulfate and floated with lime, xanthate, and pine oil. The bulk copper-lead concentrate would be retreated with cyanide to depress the copper mineral and the lead sulfide floated.

COST CRITICAL FACTOR

Perhaps the highest-cost item peculiar to flotation as compared to other mineral-dressing methods, is the cost of chemical reagents employed in the process. The cost of reagents must be kept at a minimum, and the flotation engineer often is forced to accept lower recovery and grade of product because of the high cost of suitable reagents. For example, in the flotation of some minerals such



Flotation equipment at Bureau of Mines Eastern Experimental Station, College Park, Md.

[1] Chief, College Park Branch, Metallurgical Division, Bureau of Mines.
[2] Metallurgist, College Park Branch, Metallurgical Division, Bureau of Mines.

as kyanite, celestite, rhodochrosite, and scheelite, oleic acid is often the preferred collector from a metallurgical standpoint. However, in recent years the cost of oleic acid has increased considerably, and operators have turned to cheaper reagents, such as tall oil, a mixture of fatty and resin acids, even though lower recoveries and grade of products may result.

During the war years, emphasis was placed on increasing production and developing new processes for recovering scarce minerals. Then cost of flotation reagents was not as important as it is today, when the search for less costly and more efficient separations is essential to meet increased competition. Some of the newer flotation reagents are almost prohibitive in cost but immediately before and after World War II many chemical producers began investigating the field of flotation reagents, and it is expected that with increased use these new reagents will be reduced in price.

The value of the total annual mineral production in the United States has grown from less than half a billion dollars in 1880 to over eight billion dollars today. Much of this increase has been made possible by use of the flotation process, and the mining industry will lean more and more upon flotation for future increases in production. Thus, the chemical industry must be depended upon to increase production of reagents and reduce their cost.

Certain minerals, such as graphite, talc, and sulfur, have been called "self-floating" because of their natural tendency to resist wetting by water, but even these minerals require the use of chemicals for satisfactory separation by flotation and reagents have been developed that will prevent or promote their flotation. Graphite ores may be successfully treated by employing kerosene and pine oil alone as collector and frother, but it is generally necessary to use a dispersing agent such as sodium silicate and a pH modifier such as lime or soda ash before high recovery and grade are attained. In the case of ores containing graphite, which contaminates the concentrates of some minerals because of its natural tendency to float, it is possible to depress the graphite with glue or starch.

CLASSIFICATION OF REAGENTS

Talc may be floated with fatty acid reagents or depressed with glue or starch. Mica, another troublesome mineral because of its tendency to float without reagents, may be depressed with lactic acid or floated with cationic reagents in a pulp made acid with sulfuric acid. This ability of the flotation engineer to modify the floatability of minerals at will has made possible the almost magical separations that are common practice in modern mills.

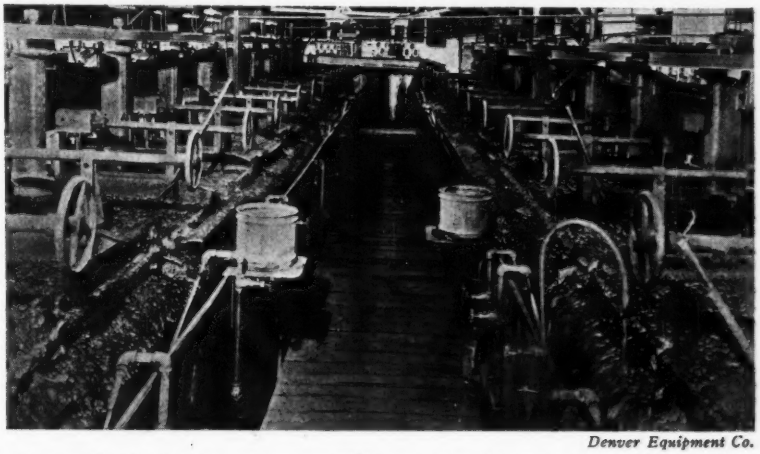
Flotation chemicals have been classified in a variety of ways since the process was first introduced. Some of the classifications were complex, and considerable disagreement arose as to the meaning of various terms. In recent years it has been general practice to discuss reagents in terms of their functions in the flotation circuit. This practice leads to a certain amount of confusion, because many reagents are not used for one function alone but may serve two or more purposes simultaneously. This fact is understood by flotation men, and the confusion that may exist is more than compensated for by the simplicity of discussing reagents in terms of functions.

The flotation circuit is roughly one in which ore, water, air, and one or more chemicals are constantly being added to suitable machines while two or more products are continuously removed. The machines in use today for performing these separations are numerous, but all have the same functions. Their main function is simply to bring the ore particles to be separated in contact with air bubbles. There are two common types, mechanical and pneumatic-agitation machines, differing from each other in the method in which the pulp is agitated and the way the air is introduced into the ore-water mixture.

The mechanical-agitation machine consists essentially of an open-topped box containing the ore pulp with a rotary agitator in the center near the bottom of the box, and driven by an electric motor. These machines may be used individually, or a number of them may be connected as a unit in series to give additional flotation time. Mechanical-agitation machines may be further distinguished by the way air is introduced. In one type, the impeller or agitator acts as a centrifugal pump, drawing air into the pulp through a hollow shaft or standpipe surrounding the impeller shaft. The other type depends upon forcing compressed air into the pulp through the bottom of the machine directly under the impeller.

Pneumatic machines are simpler than the mechanical types and consist essentially of elongated open-top boxes through which the pulp flows, air being introduced near the bottom from an external source through pipes or some form of porous bottom. These machines depend upon the air forced in under pressure to supply the necessary agitation.

The overflow of the machines is in the form of a froth containing the floated mineral, and the unfloated material is removed in the underflow together with most of the water in the circuit. The small quantities of chemicals added in the process pass out of the circuit with either the overflow or underflow, depending upon their function in the circuit.



Denver Equipment Co.

Denver "Sub-A" flotation cells process 1200 tons a day of lead-zinc ore in this operation.

The terms used most generally for the major functions of reagents are collectors, depressors, and frothers.

COLLECTORS

Collectors are those organic chemicals that have the property of changing the surface of a particle of a given mineral so as to render it water-repellent, while other particles of different minerals are unaffected and remain water-wet. These compounds contain hydrocarbon chains or rings with a polar group, such as the carboxyl group in fatty acids, which permits solution and ionization of the reagent. Those that ionize to yield a negatively charged hydrocarbon-containing ion are called anionic collectors, while those that yield a positively charged organic ion are called cationic collectors. Examples of anionic collectors are fatty acids, soaps, xanthates, alkyl sulfates, or sulfonates, and cationic collectors are typified by such reagents as the salts of alkylamine pyridine, or sulfonium bases.

The great majority of present-day flotation plants employ anionic collectors, although more and more applications are being found for cationic collectors. Research on the flotation of iron ores has indicated that anionic collectors may be used to float the iron oxides while cationic

collectors will float the silica under certain conditions. However, by employing a combination of reagents, this may be reversed so that the anionic reagent will float the silica. Cationic collectors are principally used at present to float siliceous minerals, including quartz. Work in recent years, however, has indicated that they are also useful for floating such minerals as chromite, wulfenite, scheelite vanadinite, and other minerals which contain a metal as a part of the acid ion.

DEPRESSORS

Depressors have the opposite effect of collectors and inhibit flotation of certain minerals by increasing their wettability. They may be either organic or inorganic chemicals that prevent formation of collector coatings on the minerals that are not to be floated. The mechanism of mineral depression is complex and is perhaps the least understood of all flotation reactions. Some of the reactions that may result in depression are: (1) Formation of water-wettable coatings on the mineral particles; (2) Formation of coatings on the particles that prevent reaction with the collector; (3) Detergent action which removed the collector coating; (4) Destruction of the collector by reaction to form insoluble compounds; (5) Precipitation of soluble salts in the water that would otherwise cause unwanted minerals to react with the collector to form water-repellent surfaces.

Some of the more common inorganic depressing agents in use are sodium cyanide, hydroxide, carbonate, silicate, and sulfide while the various starches, glues, gums, dextrin, tannin, and quebracho extract are examples of organic depressants.

FROTHERS

Frothers are substances that lower the surface tension of water thus creating a froth at the surface which is persistent and capable of carrying nonwetted ore particles until removed. Typical frothers are pine oil, cresylic acid, alcohols, and soaps, all of which are heteropolar organic compounds that lower the surface tension by adsorption at the air-water interface.

Since the function of froth in flotation is to change the effective density of the minerals included in it so that they will rise instead of fall through the pulp, it is important that the bubbles have a relatively long life. If the bubbles are brittle they drop their mineral load before it can be removed at the surface. On the other hand, a so-called tough froth may entrap a large amount of unwanted gangue minerals and is also difficult to handle. Suitable frothers, like other flotation reagents, are generally determined by trial in the laboratory as the frothing characteristics vary considerably and a reagent suitable for one set of conditions may be entirely unsatisfactory under different conditions. Four stiffeners are often added when conditions are such that the bubbles are too brittle. These stiffeners are normally oils such as destructively distilled pine oil or the coal-tar and wood-tar creosotes.

OTHER TYPES

Other miscellaneous terms are commonly used to describe the functions of various reagents having properties which affect the behavior of mineral particles when the major reagents are added. These reagents, usually inorganic acids, bases, or salts, may be termed *modifiers* or *conditioners* because they are generally added before the collectors, depressors, and frothers and prepare the way, so to speak, for these reagents to have the desired effect. The specific functions of these added reagents are as follows:

Activators cause changes in the surface of mineral particles which permit the collector to function properly.

pH regulators increase or decrease the alkalinity or acidity of the water to the desired point.

Dispersing agents prevent flocculation of colloidal or slime particles in the pulp.

Protecting agents precipitate or form complexes with soluble salts of metals contained in the flotation water that would otherwise adversely affect flotation.

All known chemicals are at least potential flotation reagents and because of commonly practiced methods of trial-and-error flotation testing, many hundreds of chemicals are listed as flotation reagents in textbooks and company advertising leaflets. Many of these chemicals have only been used experimentally, and others may have been found satisfactory only on a particular ore or under unusual circumstances. The flotation chemicals in large-scale use today are not numerous, and while applications for new chemicals are constantly being discovered their actual use is still more or less restricted to the laboratory.

When the enormous tonnage of ore being treated by flotation today, however, is considered and compared to that treated only a few years ago, the increased consumption of reagents is apparent. In 1932 it is estimated that 16,124,007 tons of metal sulfide ore were treated by flotation with a total consumption of 54,797,832 pounds of all reagents. During that year, flotation treatment of ores other than of the metal sulfide type, which included ores of copper, lead, zinc, gold, and silver, was not common. The treatment of ores by flotation reached a record high during the war and in 1943, 131,182,684 tons of metal sulfide ores and 3,859,630 tons of oxidized and nonmetallic ores were treated with an estimated reagent consumption of 418,631,173 pounds. Ore production following the war fell somewhat, due mainly to labor difficulties, and only about 112,000,000 tons of ore were treated by flotation in 1945 and 1946. In 1947 approximately 120,000,000 tons were treated, and while figures are not available for 1948, it is probable that well over 120,000,000 tons were treated last year.

The amounts of flotation reagents employed on various ores range from 0.1 pound or less per ton of ore treated to 5 or 6 pounds per ton, depending upon the type of ore. The average, which is constantly being reduced, is 3.1 pounds per ton of ore treated in the United States. A number of factors influence the amounts of reagents required to treat a given ore, including the relative amount of mineral to be floated, the fineness of grind, the nature of the minerals in the ore, and the condition of the mill water.

Ores such as the base-metal sulfides seldom contain more than a few percent of valuable minerals, and the amount of collector actually needed to coat the sulfide minerals is extremely small—only one or two hundredths of a pound per ton of ore in some instances. On the other hand, as in the case of some iron ores where the bulk of the ore is to be floated, 5 or 6 pounds per ton of the fatty-acid-type collector may be required. Finely ground ores or those containing excessive amounts of slimes require considerably more reagents than coarser ores because of the large increase in surface area caused by fine grinding. Naturally floating minerals, such as graphite and talc, require smaller amounts of reagents than those more difficultly floated, like phosphate rock, iron oxides, and many siliceous minerals.

The hardness and pH of the mill water have a pronounced effect on consumption of reagents. Water containing excessive amounts of calcium and magnesium salts must be softened with zeolite softeners or the salts complexed with modifiers before a suitable froth can be produced. Even moderately hard water may increase reagent consumption four or five fold for best results. Water having a low pH, whether caused by acid salts from the ore or the natural condition of the water, may result in increased reagent consumption. In sulfide flotation, xanthate collectors are preferably used in weakly alkaline solutions, because in acid solution the salt is converted to the relatively insoluble acid which decreases dispersion and requires more reagent for coating the sulfide particles.

FLOTATION NEEDS CHEMICALS

Shortages of various flotation reagents occurred during the war which indicated that reagent production facilities and raw material supply of the United States will have to be increased if future expansion of the flotation process continues as it has in the past. Most organic reagents are derived from oil, fat, or alcohol, all of which were in relatively short supply but are now more readily available at reduced prices. Inorganic reagents,

SOME COMMON FLOTATION REAGENTS AND THEIR USES

Common or trade name	Description	Use
Acid	Mineral acids such as HCl and H_2SO_4	pH regulators and activators.
Aerosol[1]	Sodium salts of sulfosuccinic acids	Dispersing agents and froth modifiers.
Aerofloat[1]	Phosphorus pentasulfide and cresol	Collectors and frothers.
Alcohol	Aliphatic alcohols, 7 to 10 carbon atoms	Frothers.
Alum	Aluminum sulfate	Activator, depressor, flocculator.
Amine	Alkyl derivatives of ammonia	Cationic collectors and frothers.
Armac[2]	Acetate salts of aliphatic amines	Do.
Armeen[2]	Aliphatic amines	Do.
Barrett oil	Coal tar creosote oil	Frother and froth stiffener.
Calgon[3]	Sodium hexameta phosphate	Water softener; dispersing agent; depressor
Caustic soda	Sodium hydroxide	pH regulator and dispersing agent.
Caustic starch	Sodium hydroxide and starch in water soln.	pH regulator and flocculator.
Coal tar	Byproduct of coal distillation	Frother and froth stiffener.
Copper sulfate	$CuSO_4.5H_2O$	Activator.
Creosote	Mixture of phenols and their esters	Frother and collector.
Cresylic acid	Mixture of *o-*, *m-*, and *p*-cresols	Frother.
Cyanide	Sodium cyanide	Depressor.
Daxad[4]	Organic salts of sulfonic acid	Dispersing agent.
Dichromate	Sodium dichromate	Depressor.
Fish oil fatty acid	Mixture of unsaturated fatty acids	Collector and frother.
Fuel oil	Mixture of petroleum oils	Froth controller and collector intensifier.
Hydrofluoric acid	HF	Depressor.
Kerosene	Hydrocarbons distilled from petroleum	Collector and froth modifier.
Lactic acid	An hydroxy acid	Depressor.
Lead nitrate	$Pb(NO_3)_2$	Activator.
Lime	Calcium hydroxide	pH regulator; activator; depressor.
Lauryl amine hydrochloride	Hydrochloric acid salt of lauryl amine	Collector and frother.
Mahogany soap	Petroleum sulfonates	Do.
Oleic acid	An unsaturated fatty acid ($C_{17}H_{33}COOH$)	Do.
Orthotoluidine	An amino toluene	Solvent for thiocarbanolide.
Pine oil	Steam distilled oil from pine wood	Frother.
Quaternary ammonium compound	Reaction products of tertiary amines and alkyl halides	Cationic collectors.
Quebracho	Organic colloid obtained from quebracho tree bark	Depressor.
Soda ash	Na_2CO_3	pH regulator.
Sodium oleate	Saponified oleic acid	Collector and frother.
Sodium silicate	Na_2SiO_3	Dispersing agent and depressor.
Sodium sulfide	Na_2S	Activator.
Sodium sulfite	Na_2SO_3	Depressor.
Starch	Soluble starch	Do.
Tall oil	Mixture of fatty and resin acids from wood pulp	Collector and frother.
Tannic acid	High molecular weight organic colloid from tree bark	Depressor.
Thiocarbanilide	Diphenyl thiourea ($(C_6H_5NH)_2CS$	Collector.
Xanthate	Products of reaction between CS_2, an alcohol, and a strong base, with the alcohol determining its properties	Collectors.
Zinc sulfate	$ZnSO_4$	Depressor.

[1]American Cyanamid Co. registered trademark.
[2]Armour & Co. registered trademark.
[3]Calgon, Inc., registered trademark.
[4]Dewey & Almy Chemical Co. registered trademark.

in general, are plentiful but many of these are not as abundant as might be desired. Sodium carbonate and caustic soda had been in short supply for several years but are now readily available. Mineral acids, especially sulfuric and hydrofluoric acids, are becoming more widely used in the flotation of nonmetallic ores and the supply will be important in the future. Fatty acids and organic ammonias or cationic amines derived from cocoanut oil and tallow are the most commonly employed collectors for nonmetallic minerals and it is important to this branch of the mining industry that the supply of these reagents be increased and the cost reduced. Many nonmetal ores do not bring a high market price as compared to metal ores, and the cost of reagents is often prohibitive, even though the flotation process would permit greater production of better grades of material.

Although flotation of nonmetallic minerals has not reached the volume of metal sulfide flotation, it is becoming more and more widespread. Nonmetallic flotation is in the position that metal sulfide flotation was some 25 years ago before the use of xanthates was discovered. Collectors are known for many nonmetallic minerals, but the cost is high, and until recent years producers have not been greatly concerned with high-quality products. Competition and depletion of high grade deposits, however, are causing many producers to turn to flotation. In the past, most nonmetal producers have depended upon selective mining and washing or hand sorting alone to yield high-grade products, but as the richer portions of their mines are mined out, many of these producers will install flotation equipment in order to be able to mine lower-grade ores.

Such minerals as phosphate rock, cement rock, barite, fluorspar, rhodochrosite, kyanite, celestite, ilmenite, and bauxite are all floated with fatty acid collectors at present. Feldspar, mica, quartz, and clay are floatable with amine collectors. Considerable interest has been shown in recent years in the flotation of coal, which is easily floated with petroleum-oil collectors such as kerosene or fuel oil and a frother. Pine oil is generally used as the frother, and lime or sodium cyanide may be added to prevent flotation of iron sulfides. Flotation of coal is only applicable when the finished coal can be marketed as a fine product, such as powdered fuel or coke-oven feed. For this reason, the major use of flotation in coal washing is in the treatment of the fines from coking coals.

OUTLOOK FOR NEW REAGENTS

Gradual depletion of the nation's large ore deposits has been of great concern to many industries as well as Government agencies. During the war, the natural resources of the United States were consumed at an enormous rate, with the result that some mines were virtually depleted of high-grade reserves. The iron-mining industry is especially concerned over dwindling ore reserves and is actively engaged in studying methods of beneficiating lower-grade iron ores. Flotation of iron ores has not been practiced on a commercial scale, but laboratory and pilot-plant research has shown that at least some of the domestic iron ores are amenable to flotation either by flotation of silica with cationic or anionic collectors after activation or flotation of iron oxides with fatty acids or sulfonated petroleum products.

Some oxidized base-metal ores are not amenable to beneficiation by any known method of mineral dressing, and flotation offers a possible means of increasing our supply of these metals, providing suitable reagents can be discovered. Pegmatites widely distributed throughout the United States are a source of several minerals, such as spodumene, beryl, tantalite, and cassiterite, and while pegmatites are being treated by flotation to recover feldspar, mica, and quartz on a large scale, the less-common minerals are not ordinarily floated. Operating mines will in future consider the treatment by flotation of their past and present tailings for recovery of additional byproduct minerals. Many of these tailings are high in feldspar, mica, and quartz, which could be utilized if the reagents required are not prohibitive in cost.

Neutral frothers, xanthates, fatty acids, and soaps now make up the largest quantity of flotation reagents, although new derivatives, both aliphatic and aromatic, are receiving a great deal of attention by research workers. In some instances the newer reagents are used commercially. The future for new reagents appears to be in the use of byproducts from chemical industries or compounds that can be manufactured economically from those byproducts.

Going after a patent? Here's . . .

How to Establish Reduction to Practice of a

Be sure you can prove you were the first to make your invention work. Inadequate proof of reduction to practice has cost many first inventors their rights to patents.

by ROGER T. McLEAN
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COMPETITIVE research of the kind commonly carried out in industrial research laboratories frequently leads to the independent completion of the same invention by two or more inventors or groups of inventors at about the same time. When this happens, and independent inventors attempt to patent such an invention, a conflict arises as to who is entitled to the grant of the patent, as under the law but one valid patent can be granted for one invention. In most countries, patents are granted to the first to file a patent application. In the United States, however, the patent is granted to the first inventor.

Where two or more independent inventors apply for a patent for the same invention in the United States, the Patent Office is required to determine which is entitled to the patent and to grant the patent to the one which was in fact first. The Patent Office presumes that the first to apply is the first inventor, unless a later applicant is able to prove that he was in fact first, whereupon the patent is granted to the later applicant. The procedure by which the Patent Office makes this determination is called an "interference." The frequency with which interferences are declared may be gauged by the fact that about 2,500,000 patents have been granted in the United States since the present numbering system was started early in the 19th century, while some 84,000 interferences have been declared.

It is painful (and expensive) for an inventor to be denied a patent for an invention which he independently made because of the fact that some other inventor, without his knowledge, made the same invention before him; it is a great deal more painful for an inventor to lose his right to the patent to a later independent inventor because of incapacity to establish, by acceptable proof, the dates of his invention. In nearly all respects the rules which the Patent Office uses in evaluating evidence as to dates of invention are as stringent as any in the entire field of civil, as distinguished from criminal, law. In one vital respect the Patent Office has a rule of evidence which is as severe as any rule of criminal law, including the severe rule established by the constitutional requirement with respect to proof of the crime of treason, that is, the requirement of two witnesses to the same overt act. For example, evidence sufficient to support a conviction and the death sentence in a capital case, is insufficient as proof of completion of an invention, as has been pointed out by a member of the Board of Appeals of the Patent Office.

THE STEPS IN INVENTION

There are two steps involved in the making of an invention. The first is, in Patent Office parlance, "conception." This is a mental act, and what it means is that the inventor has a complete mental grasp of the invention. If it is a process, conception includes a complete outline of the operative steps of the process, and the result which it will give, including the materials to be used, the operations to be performed and the nature of the product. If the invention is a new chemical, conception includes its formula, a method of producing it, and its specific field of utility when it is produced. Because conception is a mental act, it is readily susceptible of proof, as, for example, by communication to others, by recording it in a notebook or memorandum, or the like. The existence of a written record at a given date establishes that the man who wrote it had whatever is written in mind, i.e., conception, at the time he wrote it.

The same is true of communication of the concept to someone else. In order to communicate it, the inventor must have had it fully in mind, that is, completed the mental act of conception. Conception is thus proven by establishing that it was recorded in a suitable written record or properly disclosed to some other person or persons. While questions frequently arise as to whether such records or communications are sufficient to establish conception, in the sense that one or more elements of the invention may be lacking, any chemist who keeps adequate records of his ideas, writes memoranda to others, or has his notebook entries with respect to such ideas witnessed by others capable of understanding the subject matter, has little difficulty in establishing conception to the extent he had it.

The second step in the completion of an invention is that step in which the invention is practiced and its usefulness is established. This step is known, in Patent Office parlance, as "reduction to practice." Broadly speaking, the requirements for a reduction to practice are that the invention be practiced and its usefulness demonstrated. The scale of the reduction to practice may be small or large. The extent of demonstration of usefulness required varies widely, depending upon the type of invention involved. For example, where the invention involves a new process for the production of an old product, such as a new process for making alcohol, reduction to practice may involve merely carrying out the process and showing that alcohol is effectively produced by it. Where the invention is a new product intended for use as a chemotherapeutic, reduction to practice may require not only the preparation of the product and the usual animal tests of physiological properties, toxicity, etc., but also actual clinical testing to establish its usefulness for its indicated purpose in medicine. An improvement in the operation of a cracking unit may require operation on a commercial scale for reduction to practice, whereas a new synthesis of a known chemical may be reduced to practice in a test tube.

The period between conception and reduction to practice may be very short. Indeed, the two may be simultaneous, as was the case with Goodyear's invention of vulcanization of rubber, where he had no conception of the heating of the rubber with sulfur and the result which would be obtained thereby until he accidentally dropped such a mixture on a hot stove and observed the vulcanizing effect. Here conception and reduction to practice occurred simultaneously. On the other hand, conception and reduction to practice may

Chemical Invention

DETERMINING PRIORITY OF INVENTION

The broad rules for determining priority of invention are simple and may be stated as follows:

1. The inventor with the first conception of the idea and the first reduction of the idea to practice is always the first inventor.

2. The inventor with the first conception who, following his conception, is diligent in reducing his invention to practice, is the first inventor, whether the inventor with the second conception has the first reduction to practice or not.

3. The inventor with the first reduction to practice is the first inventor even if he was the second to have the conception, unless the inventor with the first conception was diligent in reducing to practice.

Proof of conception is usually relatively simple. Proof of reduction to practice is a more difficult matter.

be years apart, as, for example, in the case of Joy's invention of a mining machine where, after conception of the improved machine, he spent some thirteen years trying to get backing to build one which, when built and successfully operated, constituted his reduction to practice (*Joy* v. *Morgan*, 295 Fed. 931).

The filing of a patent application which adequately describes an invention is regarded by the Patent Office as the full equivalent of completion of the invention and establishment of its utility. Such an act is termed a "constructive reduction to practice." Because a filed application is an official record of the Patent Office, the date of such a "constructive reduction to practice" requires no further proof.

DETERMINING PRIORITY

The purpose of this paper is to outline some of the difficulties encountered where an inventor seeks to obtain a patent for an invention independently invented by someone else on the ground that he and not the other inventor was first, in particular, the difficulties resulting from the stringent Patent Office rule as to proof of reduction to practice.

The broad rules for determining this question of priority of invention are simple. They may be stated generally as follows:

(1) The inventor with the first conception and the first reduction to practice is always the first inventor.

(2) The inventor with the first conception who, following his conception, is diligent in reducing his invention to practice, is the first inventor, whether the inventor with the second conception has the first reduction to practice or not.

(3) The inventor with the first reduction to practice is the first inventor even if he was the second to have the conception, unless the inventor with the first conception was diligent in reducing to practice.

The Patent Office presumes that the first to file his patent application is the first inventor, and one who files his patent application later is required to prove that he was in fact first. Obviously, he can prove this only by showing facts which warrant the conclusion that he was the first inventor by the application of one of the rules outlined above. In most cases this requires the establishment of an actual reduction to practice prior to the other inventor's filing date. It may or may not require his establishing reduction to practice prior to the other inventor's actual reduction to practice.

As previously pointed out, proof of conception is usually relatively simple. Proof of reduction to practice is more difficult. Inadequate proof of reduction to practice has cost many first inventors their rights to patents. An inventor seeking to establish a reduction to practice is required to show that he carried out the process or made the product or machine of the invention and demonstrated its utility. In doing so, the inventor has the burden of proof, that is, he is required to show by what is known as a "preponderance of evidence" that he in fact did reduce the invention to practice. With this burden of proof, that is, a requirement to show the existence of certain facts by a preponderance of the evidence, the inventor must produce not only his own testimony, but also must produce corroboration of his testimony. He is properly regarded as an interested party and it is quite reasonable that he should produce something in addition to his own testimony or his own private records as to what he did.

The Patent Office and the Court of Customs and Patent Appeals (the court which decides appeals from Patent Office decisions) in their holdings as to what constitutes corroboration of an inventor's testimony as to reduction to practice have gone far beyond what other tribunals require for corroboration with respect to other controversial issues. Thus, an inventor who carries out a process in his laboratory, makes a record of what he did in his notebook, has the notebook witnessed by an associate who understands what is stated in it, writes a report to his superior outlining what he has done and suggesting that the process merits commercial exploitation, which report is followed by the making of a market survey by the employer of the inventor, with complete absence of suspicious circumstances, is not corroborated. The testimony of his coworker and his superior and the testimony of those who made the market survey does not corroborate his testimony that in fact he did carry out the process at the stated time.

The Patent Office reasoning is that no one else having seen the inventor carrying out the process, there is no corroboration of his statements as to what he did, all being based upon information imparted by the inventor to his associates, evidence generally termed "hearsay." The circumstantial evidence of the market survey, of the employer's interest in the process, the contemporaneous witnessing of the notebook by an associate, are all regarded by the Patent Office as in the same self-serving class as the testimony of the inventor himself (*Cunningham* v. *Lanzetti*, Intf. No. 73,765).

Another illustrative case is one in

which an inventor made a new type of vacuum tube and established and recorded its characteristics. The fact of existence of the tube, but not its construction, was known to his associates. The characteristics of the tube were known to his associates. In attempting to show that this tube was a reduction to practice, the inventor testified as to its construction and its characteristics. Associates testified that they had known about the tube and its characteristics at the required early date. It was urged that the characteristics of the tube were unique, that no known tube except that of the invention in controversy had those characteristics, and that the inventor could not have obtained the results he obtained unless the tube was built in accordance with the invention. Nevertheless, because no one other than the inventor was familiar with the construction of the tube, it was held that the inventor's testimony was not sufficiently corroborated to show reduction to practice. It was in this case that one of the members of the Board of Appeals in the Patent Office dissented and pointed out that it was more difficult for an inventor to establish reduction to practice than it was to obtain a conviction for murder (*Bambridge* v. *Walton,* 42 USPQ 138).

This rule is not one based upon disbelief of the inventor, that is, it does not involve a determination of whether the Patent Office believes the inventor is testifying truthfully or falsely. It is a positive rule of law which is applied even where the Patent Office or the court has no reason to disbelieve the inventor and in fact indicates it believes him. Thus, a recent case in which the invention involved in the interference was a new chemical compound, the inventor testified that he produced it at a sufficiently early date, preserved some of it, and had it analyzed by the analytical division of the company for which he worked. He produced a witness who testified that he saw the inventor make the product by combining three stated reactants in a flask and agitating the mixture, that shortly thereafter the inventor showed him some of the product, that later the witness saw the inventor place part of the material in a coded bottle. Other witnesses testified that the coded bottle was delivered to the analytical division and analyses made. It was held that reduction to practice was not proven because of lack of corroboration on the ground that the witness who testified he saw the product made did not know that the product which the inventor exhibited to him was that which he saw made and did not know that the product which he saw placed in the coded bottle and delivered to the analytical division was that which he saw made. The court observed: "Under ordinary circumstances it would be reasonable to conclude that events happened just as is claimed. There is no suspicion of any attempt on the part of any of the witnesses, all of whom are of high character, to falsify or make misleading statements" (*Thurston* v. *Wulff et al.,* 76 USPQ 121, C.C.P.A.) Concededly, in this case the reduction to practice, if it could have been proven, would have been adequate. The man who was obviously the first inventor lost his right to the patent because of failure of proof.

WHAT TO DO?

The question, of course, arises, as to what, under these circumstances, can an inventor do to protect himself against loss of rights and what can he do to make sure that in the event he seeks to establish a reduction to practice he can establish it. The only safe procedure would seem to involve having someone who is not the inventor or joint inventor independently observe, or carry out, each and every operation involved in the reduction to practice. It need not be one person, as, for example, one chemist might prepare a chemical and a bacteriologist or pharmacologist or clinician test it, but from beginning to end of the operation it would seem necessary to have witnesses fully familiar with the operations who are independent of the inventor or inventors. Indeed, the Court of Customs and Patent Appeals has apparently arrived at the conclusion that in view of the rule with respect to proof of reduction to practice this is the only safe course to follow. Thus, that court stated on February 10, 1948:

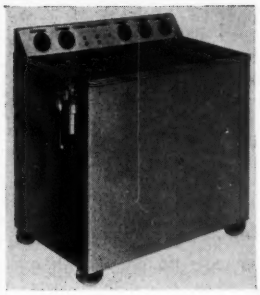
> "It is not infrequently complained that the enforcement of the rule works a hardship upon inventors. There are many laws which are recognized as sound and necessary the enforcement of which, in some instances, work hardships. We can discern no good reason why the rule of corroboration in patent jurisprudence should do so, particularly since it is a rule of such long standing and one so universally known. In laboratories such as that of Industrial Rayon Corporation (the owner by assignment of the application here involved) which employed appellant, it should not have been a difficult task to reduce the invention to practice in the presence of competent chemists in the employ of the corporation who could have identified every requisite step that was taken." (*Israel* v. *Cresswell,* 76 USPQ 594 at 598.)

Additionally, it must be remembered that the testimony of the joint inventors is not accorded any more weight than the testimony of a sole inventor. In other words, if there are two or more joint inventors their testimony collectively is not more satisfactory in respect of proving reduction to practice than is the testimony of a sole inventor. One of two or more joint inventors cannot corroborate the testimony of another.

It is interesting to note that this rule, which for practical purposes involves the assumption that the inventor is unworthy of belief despite the vehement denial of the Patent Office that this is so, does not depend upon the interest of the inventor in his application. In one case an inventor had left the employment of a company to which he had assigned a patent application. He subsequently became director of research of a competing company. Another employee of the competing company had filed an application for the same invention and the two became involved in interference. The inventor's interests were plainly adverse to those of the owner of his application. Nevertheless, it was held that his testimony with respect to reduction to practice, adverse to his interests at the time the testimony was taken, was subject to the rule. (*Calvert* v. *Gebauer-Fuelnegg and Moffett,* Intf. No. 75,047).

In another case, to corroborate an inventor as to reduction to practice, testimony of his wife and a man to whom he had sold a third interest in the invention was offered. It was attacked on the ground that it was not entitled to more weight than that of the inventor because of the obvious interest of the witnesses. This attack was rejected and it was held that testimony of the inventor's wife and the purchaser of a part interest in his invention was to be accepted as adequate to corroborate the inventor. Fortunately for the inventor the invention was a simple one which his wife and financial backer could readily and fully understand.

It would seem that under this rule, the lone wolf inventor, the man who works alone and completes his inventions alone, has no way of establishing a date of reduction to practice. His only hope lies in changing his lone wolf characteristics and taking others into his confidence to the extent of making them fully familiar with the operations which he relies upon for a reduction to practice, or in the early filing of his patent applications. Industrial laboratories, if they are to avoid jeopardizing their patent rights to inventions and to afford themselves maximum assurance that such inventions as they are the first to make will be patented to them, have no recourse except to (1) have the inventions reduced to practice by someone other than the inventor, which is a stultifying procedure at best, or (2) make sure that each act connected with a reduction to practice which is carried out by the inventor is carried out in the presence of competent technicians who can identify every requisite step taken, which in effect means that each inventor engaged in perfecting an invention must have a shadow observing each move, or (3) file patent applications at the earliest possible date, accepting the difficulties inherent in rushing into the Patent Office before an invention is fully explored.



High-Energy ULTRASONICS Opens Process Prospects

APPLICATION OF ULTRASONICS TO PROCESSING PROBLEMS has been delayed by the lack of high-energy equipment. A new generator promises industrial applicability.

BRUSH Development Co. is now manufacturing ultrasonic units of industrial capacity, to be marketed under the trade name of "Hypersonic."

The new units break through the capacity barriers formerly faced in applying ultrasonics to practical industrial use, and offer to industry, on a full-scale production level, techniques that heretofore existed only in the laboratory.

Hypersonic equipment is now available to industry in three models of varying capacity: First and smallest of these is for laboratory-scale research. The second is a much more powerful pilot-plant model which can be used for production operation. The third type is a full-scale production unit, custom built to the specific requirements of the industrial user.

The full possibilities of ultrasonic energy can be understood only if the action and effect of this phenomenon is, at least to some extent, realized. The powerful action of ultrasonic vibrations is made possible by the tremendous accelerations connected with it. As compared with gravity, which produces an increase in velocity of 32 feet per second in a falling body, or that of a bullet fired from a rifle, the acceleration in a high-intensity ultrasonic wave in a liquid is extraordinary. The acceleration rate produced may be as high as 12,500 miles per second each second. This action, repeated first in one direction and then in the opposite direction 1,000,000 times per second, applied continuously to a physical bdoy, would move it a million miles in 10 seconds.

It is this acceleration which, when directed into molecules of a substance under treatment, can provide a number of chemical or physical phenomena which may bring about desired changes in molecular structures and other properties.

Ultrasonics, and their application to industrial problems on a laboratory or research basis, are more or less known in industry. Research divisions of many firms engaged in production and processing are familiar with the effectiveness of ultrasonic force when applied in specific processing techniques. The successful results obtained in processing a wide range of products—liquids, solids, powders and gases—have created interest in this new technique.

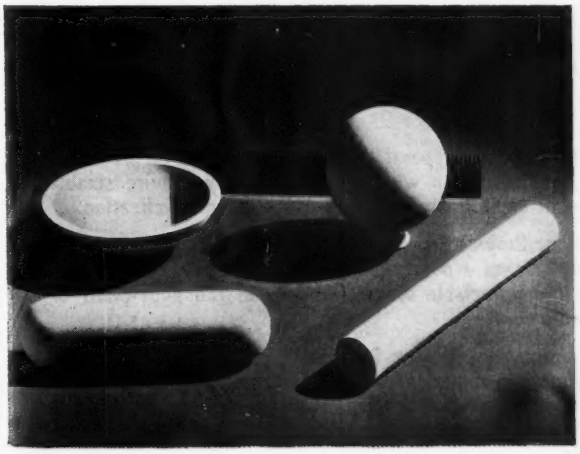
The use of ultrasonic energy is important, not only in industrial manufacture, but in biological and agricultural fields as well. Here is a brief list of accomplishments in various fields:

(1) The complete emulsification of non-miscible liquids such as oil and water.
(2) The suspension in a liquid of powdered material of different basic characteristics.
(3) The rearrangement of the molecular structure within a great variety of substances.
(4) (a) The acceleration of bacterial growth, or (b) destroying bacteria.
(5) The acceleration of electrolytic agents as in plating operations.

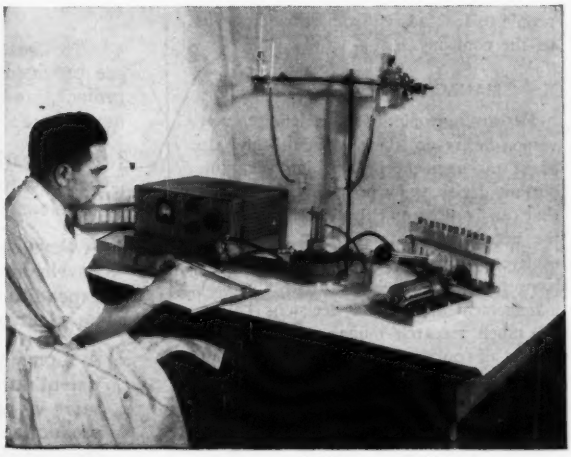
All these past accomplishments, however, have been on a laboratory or test-tube scale due to many limiting factors.

The prime source of ultrasonic force is found in piezoelectric devices. This phenomenon, discovered in 1880, has been studied with increasing vigor during the past 25 years. Quartz and other similar crystals have piezoelectric properties. This means that the crystalline structure of the element produces controlled vibrations upon the appplication of electric current. The major limitation of the use of natural quartz is the lack of crystals large enough for full-scale in-

(*Turn to page 986*)



Laboratory-scale ultrasonic unit demonstrating emulsification.



Ceramic transducer elements showing various forms manufactured.

How to Get Top-Level Guidance in

RESEARCH THAT PAYS OFF

KEEPING MANAGEMENT INFORMED

by JOHN BEGERT, Director of Product Commercialization
Johns-Manville Corporation, New York, N. Y.

FAMILIARIZING MANAGEMENT with a project as it progresses increases the probability of getting the green light if it is worthwhile.

RESEARCH is facing some very real problems in these changing times. Present economic and tax trends threaten the availability of venture capital which has to pay the way. In addition, the rate at which achievement after achievement is being piled up in research development exceeds the ability of some companies—and even entire industries—to put these benefits to work.

The volume of research achievement and the increasing expense have raised the critical question as to whether our nation might not be approaching overproduction in research accomplishment. In the past, a research organization could proceed with some assurance that any completed research development that offered possibility of satisfactory profits—profits that assure jobs and make possible improvement in living conditions—could at once be put into commercial production. This is no longer the case.

It is, therefore, increasingly important that research planning and investigation be closely geared to market needs, availability of money to finance the work, and proper concern for the company's long-range planning.

This involves a great deal more than a willingness on the part of research people to seek advice from other divisions of the company.

MANAGEMENT NEEDS HELP

Research people have a definite, new responsibility in these difficult days to assist management in reaching such important decisions by providing, in a form that can be used quickly and intelligently, the necessary information on which executive action can be based. They also have the responsibility for urging that management face these decisions before too much research money is committed.

It is, of course, essential that a research development be accomplished without waste of funds. It is equally essential that available research funds not be tied up in research accomplishments that cannot be immediately commercialized. Therefore, it is of great importance that each phase of a research investigation be periodically checked to establish its commercial importance. This requires a very close, flexible gearing of research activity to changing sales and market developments within the framework of available finance.

Since successful commercialization is the ultimate aim of most newly undertaken research projects, it is necessary to know as early as possible whether the project complies with the basic requirements of commerce and to have the answers to such questions as these:

1. Does the product have quality and characteristics that fill a public need so well that consumers will buy it?
2. Will the engineering and construction costs for production facilities be low enough to permit a return on investment that will justify and attract capital funds?
3. Will the product cost be low enough to permit competitive pricing and still return a fair profit?

RESEARCH MUST PREDICT

Cost accountants do not like to make assumptions when calculating costs. It is therefore necessary for the research technicians to set up the basis for these calculations using whatever data are available and making any assumptions or predictions that are required for the project analysis.

In order to obtain management guidance in directing research activities into projects most likely to be commercialized and to obtain cooperation from other departments in supplying market engineering and financial information needed to keep research headed toward profitable areas, it is necessary that simple and direct methods of presentation be devised for project proposals.

A method to focus attention on specific types of research projects in order to secure management guidance has been developed by Johns-Manville. This procedure will show how our company is approaching the problem in the new laboratories and pilot plants recently dedicated in the Research Center at Manville, N. J.

In Johns-Manville, the sole responsibility for the research program rests with the vice-president for research and development. His organization has many research projects in commercial operation.

It is our desire that a still higher percentage of research projects be accepted and put into commercial production at an early date. In order to assist in authorizing those projects which are most likely to be accepted, we have developed

THREE CHANCES . . .

are provided for Johns-Manville's management to review a research project, and either cancel it or authorize continuance into the next phase:

1. **A Research Project Proposal is submitted to cover research activity to be undertaken which may eventually require sizable development or capital expenditures for full commercialization.**
2. **A Development Project Proposal is submitted when the laboratory development reaches a point where further progress requires the expenditure of appreciable sums of money in the pilot plant or on plant equipment.**
3. **A Commercialization Project Proposal is submitted when sufficient information, experience, and data have been compiled to serve as a basis for specification, within limiting ranges on a production basis, of equipment, process, and other operating requirements.**

Condensed from papers presented by the authors before the Industrial Research Institute, Inc., October, 1949.

a simple and direct Project Proposal procedure.

Under this system of Project Proposals, the research organization of Johns-Manville has been able to give the operating divisions of the company the information they require in order to determine their interest in developing or commercializing new processes and products. These same proposals have contained the information needed by other divisions of the company to prepare the financial analyses necessary to justify any capital expenditure that may be involved.

THREE REVIEWS

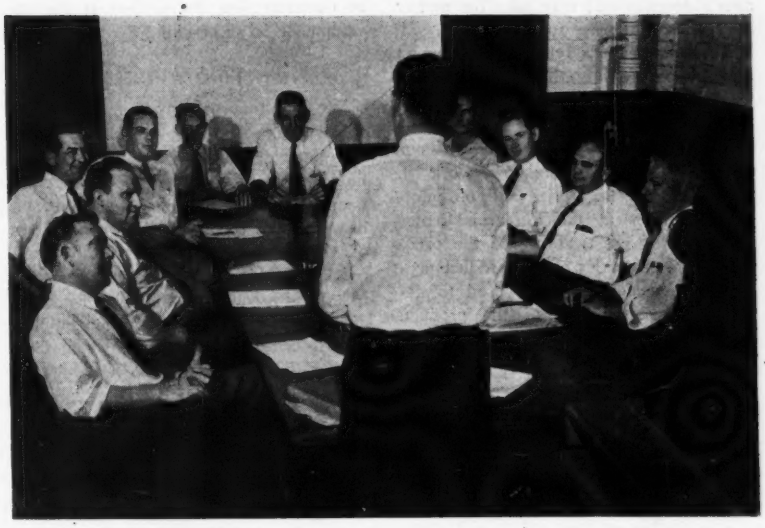
This system is designed to secure management review at three distinct points in the progress of the project. In J-M, we call them Research Project Proposals, Development Project Proposals, and Commercialization Project Proposals.

The exactness of the information presented will, of course, vary with the type of proposal. The information in a Research Project Proposal will be an estimate of what it is anticipated can be accomplished if the recommended project is undertaken and successfully completed. The information in a Development Project Proposal will be as complete as the experimental work permits. The information in a Commercialization Project Proposal must be sufficiently exact to form a basis for plant design and justification of capital expenditure.

The Project Proposal system is designed to supply the operating division with information and data in complete form, which the divisions must have to form an intelligent opinion regarding the extent of their interest. This includes:

1. Sufficient information about the nature and characteristics of the product to make possible a forecast of sales volume and possible selling price.
2. Sufficient information about the raw materials, formula, and the manufacturing process to enable the division's operating people to form an opinion regarding the operability of the process and to permit the calculation of the probable range within which the manufacturing cost may lie.
3. A flow line of the proposed process with equipment required and sufficient information about the operations to be performed to enable the engineering department to make a plant layout and an estimate of necessary capital expenditures.
4. Proposed program, including an itemization of the various steps to be taken and a possible timetable which might be established.

A Project Proposal is prepared when research information indicates that a substantial expenditure should be made to provide facilities for commercialization of specific products or new production processes, pilot plant development, or a major research project.



Long before the final project is submitted, management has had an opportunity for previews of the capital requirements and profit possibilities.

A *Research Project Proposal* is submitted to cover research activity to be undertaken which may eventually require sizable development or capital expenditures for commercialization.

A *Development Project Proposal* is submitted when the laboratory development reaches a point where further progress requires the expenditure of appreciable sums of money in the pilot plant or on plant equipment. This expenditure may be necessitated by the need of new equipment or modification of present equipment on which to conduct the experimental runs.

A *Commercialization Project Proposal* is submitted when sufficient information, experience, and data have been compiled to serve as a basis for specification, within limiting ranges on a production basis, of equipment, process, and other operating requirements.

OPERATING DIVISIONS APPROVE

Johns-Manville has been using these methods for eight months and has found them satisfactory. We are gratified to find that the operating divisions also like this method of presentation. They prefer to do their own engineering, make their own product cost estimates, conduct their own sales surveys and business appraisals. Their only requirement of research is that the data in a Proposal be sufficiently complete to serve as a basis for such estimates.

This is not so difficult in the case of a Commercialization Project Proposal, since it is presented only after research and development work have been completed, and the basic data used have been confirmed on pilot plant or semi-production scale.

The preparation of a Development Project Proposal or Research Project Proposal is more difficult. The research technician must look deeper into the crystal ball and forecast rather distant preconceived end points on what may be relatively meager data.

Our laboratory budget provides general funds for initial exploratory work or examination of a new idea. These funds are at the disposal of the research department managers and may be used at their discretion for preliminary lab work. Many new ideas are constantly being explored by research technicians, under the provision of normally budgeted funds.

However, time-out is called when the work on any new idea progresses to a point where it is evident that sizable expenditures may be required for extended pilot-plant development. At this point, a Development Project Proposal is prepared outlining the intended project with an estimate of the cost for the development work. It will also include a forecast of the probable process and equipment that will be required for commercial production if the development is successsful.

The Development Project Proposal is presented to the division manager with the request that he evaluate the Proposal and advise the research department of the extent of his interest in the project and to give assurance of support by the management in providing capital funds for new production facilities if the development is successful. If the response of the division manager is unfavorable, work on that particular project will be dropped. Research effort will be turned to some other project with a more favorable chance of acceptance.

The vice-president for research and development, as a senior officer, has the right to disagree with the division man-

ager's decision and may take the matter to higher authority for settlement.

An example of a typical Development Project Proposal is the development of a new chemical process to make new products which are closely allied to the present standard products of one of our major divisions. Preliminary work in our research laboratories and on pilot-plant facilities at the Research Center indicated the practicability of the process. Small quantities of the product produced experimentally were used to determine the character of the product. Small lots were sold with favorable customer acceptance.

It is now desired to conduct semi-production runs to confirm the process, determine final specification of equipment required and to secure accurate cost data. The net cost of this plant experiment will be $75,000. It would lead to a capital expenditure of over $1,000,000 when fully commercialized, and would also introduce a new type of manufacturing process not heretofore undertaken by J-M. This Development Proposal is now before the division manager. If his answer is unfavorable, no further work will be conducted on this project at this time. There would be no point in spending this sum unless the operating division can secure prior commitment on the capital funds necessary to commercialize the project if the development is successful.

PICKING WINNERS

We feel that presentation of research achievements through our procedure is an effective means of getting favorable final action on a project. Long before the final project is submitted, management has had an opportunity for previews of the capital requirements and profit possibilities. The final request for capital funds becomes simply a confirmation of figures which the management has already accepted to justify commercialization. These previews of Research and Development Project Proposals provide the research department with an indication of management's interest as the work on a project progresses. It enables the research department to guide its activity toward projects most likely to be accepted for commercialization. It makes it possible to pick winners early in the game.

It has been said that the research director's job is not done when the product has been invented, designed, and proven in theory. He has to sell it just the same as if he were a private inventor. We believe this is true and feel that the easiest road to a sure sale is to have projects that offer the most favorable opportunities to make money.

PATTERN FOR RESEARCH GROWTH

by W. A. MYERS, Assistant Manager
Research and Development Department
Atlantic Refining Co., Philadelphia, Pa.

THE RESEARCH DEPARTMENT'S relationship to top management must change as research expands from a few men to a full-fledged, autonomous group.

THE LIFE of a research department may be divided into three phases. We shall call Phase I the early life when the department is small and the problems are few in number; Phase II we shall call the middle life or transition period when the number of problems and the size of the department are growing rapidly; and Phase III, the maturity period when the department has reached a point where its activities are commensurate with the other activities of the company.

The Research Department of The Atlantic Refining Co. was organized twenty-five years ago and has passed through Phase I and Phase II and is now in Phase III of its life. This background will serve for illustrations of the differences in techniques used to obtain management guidance in directing the research activities into projects most likely to be commercialized.

FIRST: CLOSE-KNIT, INFORMAL

A small, recently-organized research organization is in all probability set up by management because a need for research in several specific fields is apparent. It may well be accomplished by consolidating several technical service groups and other activities of a similar nature. Consequently at the outset the problems are fairly clearly defined. Since they are small in number, they can and will be actively followed by management, and guidance is automatically obtained. At this stage in the development of an organization, individual problems are likely to be in complete charge of one member of the department and the organization is more or less on a project basis. During the first five to ten years of the life of a research department it is likely to multiply in size several times and still remain a relatively small, close-knit organization. Informal contacts with management during this period can be satisfactorily handled by the research director, and in most cases he will be reporting directly to the general manager of one of the company departments.

In our own case this phase extended over a period of about eight years, during which the department approximately trebled in size and no formal setup for the coordination of research activities with the general company policy was considered necessary. The research director could personally handle this coordination, which in our case largely involved the manufacturing departments.

At some point in the growth of the department the research director finds himself assigning certain phases of all problems to individuals or groups of individuals who are most competent to do this particular type of work. As examples of this, the analytical work tends to be concentrated in one group for the whole department. The same is true for the laboratory operations, the pilot-unit operations, the administrative activities, the evaluation activities and other phases of the work. Coordination of these activities becomes a major problem for the research director, and the proper presentation of progress reports and discussion of progress with management becomes more difficult.

An increase in the number and variety of research results available for application further increases the problems of the director. A growing research department at this stage of development will find increased interest on the part of other departments of the company in the research department's activities. The director finds that an increasing amount of his time is necessary for explaining and selling his activities to the heads of the sales, manufacturing, production, transportation and other departments. He will further find that considerable effort will be required in unselling various people in the operating departments on some ideas for research work which have little prospect of success or would be of doubtful utility even if they were successful. The combination of these factors tends to snowball and make the life of a research director interesting and rather difficult. As examples of the breadth of activities in our research department we are currently directing our efforts toward such diverse aims as:

1. Finding oil pools.
2. Drilling techniques.
3. Reservoir operations, including cycling and repressuring.
4. Pipe-line corrosion.
5. Natural gasoline recovery.

THREE PHASES . . .

in the life of a research department demand differences in techniques used to obtain management guidance:

During the first five to ten years of the life of a research department (Phase I) it is likely to multiply in size several times and still remain a relatively small, close-knit organization. Informal contacts with management during this period can be satisfactorily handled by the research director.

During the next period of time (Phase II) the stature of the research department in the company's structure often grows markedly; and the general manager of the research department may become a member of the board of directors. A research advisory committee may more adequately represent management's views.

The research advisory committee, whose activities tend to become routine, is likely disbanded (Phase III) and research activities placed on an annual budget. Distribution of activities is customarily left to the research director, who by this time may be a vice-president. As the activities and size of the company grows, additional coordination between departments at various levels of management may be desirable.

6. Gasoline, burning oil and lubricant manufacture.
7. Wax, asphalt and chemical manufacture.
8. Marine transportation of special products.
9. Product application research.
10. Sales promotion.
11. Process design.

This stage is likely to reach a climax some time within the first ten years of the life of the department.

SECOND: ADVICE NEEDED

In our own case we arrived at this point in our eighth year. In order to improve the coordination it was decided to set up a research advisory committee to formally handle the coordination. This committee was composed of representatives of the manufacturing, economics, patent, sales, and research departments. The committee activities partially replaced informal contacts with these individuals with a more formal procedure. The individuals on the committee were high-level management, and since all of them had responsibilities that occupied a large portion of their time, efforts were made to streamline procedure and to coordinate all of the thinking.

A hindsight view of this action indicates that at the time this was a logical and desirable procedure. In our own case, during the life of the advisory committee a cost-accounting system was devised and installed which permitted rapid determination of the costs of each project. An evaluation system for the results of research was worked out; while this system is somewhat arbitrary and has many objections, it has permitted the management of the company to see some of the returns for the research dollars expended. A system was developed of approving expenditures before they were undertaken. The research advisory committee received statements of costs, returns, proposals for new work undertaken and progress reports on work already under way. These could all be discussed at periodic stated intervals, and the research department learned a good deal about how to sell their work and what results management was most interested in. During this period the research department operated without a fixed budget and the committee supplied management guidance for the research activities.

In our company, throughout the life of the research department, we have followed a policy of hiring in the research department practically all of the young technical people for the company. As positions of responsibility become open in the operating departments and in some of the other staff departments, men with several years of experience in research are transferred to them. As a result of this procedure a large part of the company's staff is research-experienced. They are very familiar with the activities of the department and have kept familiar with them after transferring. Thus, the problem of coordinating research work with general company activity has obviously been minimized by this transfer of personnel.

During this period of time (Phase II) the stature of the research department in the company's structure has grown markedly; and the general manager of the research department became a member of the board of directors of the company. The activities of the advisory committee tended to become routine, since most of the actual coordination was accomplished outside of and prior to their meetings. The activities of the committee became rather time-consuming: each of the members had to go over a large number of reports, and arranging meetings for people with diverse commitments became difficult. These evolutionary processes tended to minimize the accomplishments of the research advisory committee. The period covered by these developments represented approximately fifteen years and, while it was felt by all concerned that the advisory committee had served a very useful purpose, it was further felt that it had probably outlived its usefulness. At this stage our research department had passed into Phase III of its life and was approaching maturity.

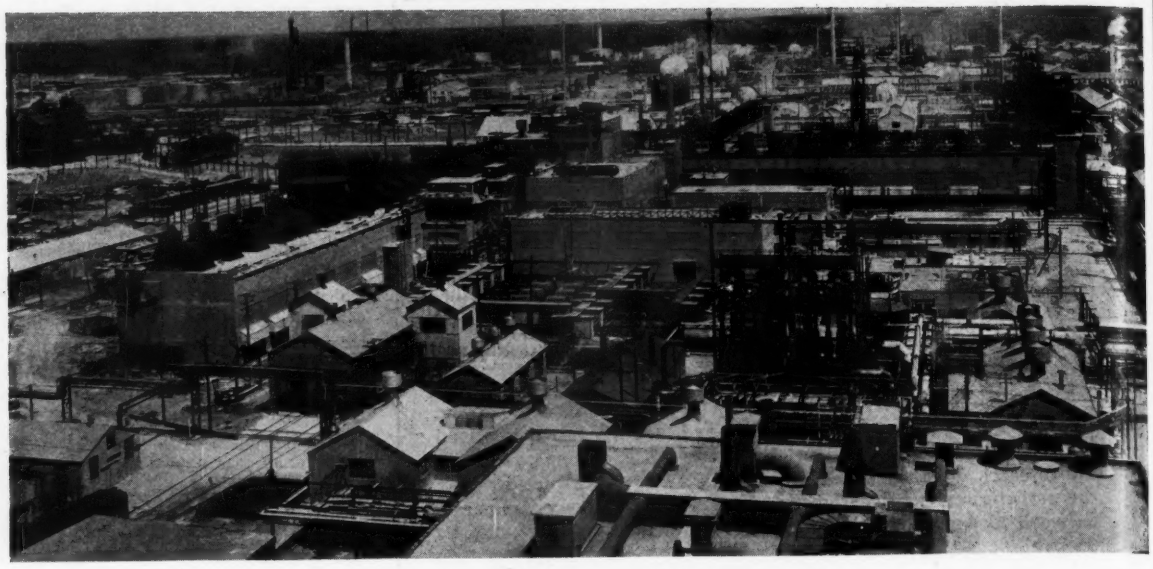
THIRD: PART OF TOP LEVEL

The research advisory committee was disbanded and research activities were placed on an annual budget. Distribution of activities was left to the research director.

Abandonment of the research advisory committee left the problem of securing management guidance to informal contacts between the research director and members of management. But by this time the research director had become a member of the board of directors and a vice-president of the company. This system is functioning very satisfactorily.

As the activities and size of the company grew, we found that additional coordination between departments at various levels of management was desirable. This additional coordination is being accomplished by the organization of a group of committees, each of which coordinates the activities of the various departments of the company on some specific portion of our business. While the prime purpose of these committees is to coordinate operating activities, the operating executives of the company felt that the research department should have a representative on each of these committees so that research activities would be coordinated at lower levels as well as at top-management level. These groups are making a definite contribution toward coordination of research work with the major objectives of the company.

The combination of all these factors permits our company to obtain the guidance of management in directing research activities into projects which will be worthy of commercialization. This is a "must" for the proper operation of any research department: contrary to the belief of some people, industrial organizations have no desire to spend money on research results which are to be put on the shelf. Money spent on research which is not applied is money wasted.



Sodium area, where capacity underwent a 50 per cent expansion.

ETHYL Completes Expansion Program

COMPLETION OF ETHYL CORPORATION'S $40 million expansion provides more tetraethyl lead for a growing market.

ALMOST two and a half years ago (*CI, July, 1947, p. 39*) Ethyl Corp. revealed a planned $20-million expansion of its tetraethyl lead capacity at Baton Rouge, La. Just last month the final unit was completed, ahead of schedule, and the total expansion ran to twice the original figure—$40 million in all.

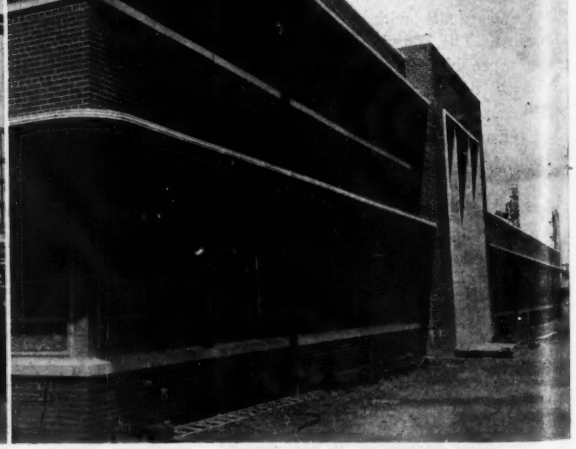
Shortly before the new units were ready, the company turned out its 1¼ billionth pound of TEL, and the capacity of the plant was estimated at 175 million pounds a year (*CI, Feb., 1949, p. 316*). But the increase in automotive fuel consumption, the preference for knockless gasoline, and the trend toward higher-compression motors pointed to an increasing TEL demand beyond the capacities of Ethyl and Du Pont, its two producers. (Du Pont is now producing TEL on its own since the patents expired in 1947.)

Ethyl's capacity increase is estimated at 40 per cent, bringing it to three times Du Pont's production.

SODIUM

Sodium, which is used to make an

New ethyl chloride and ethylene dichloride units cost $3 million.



Newly-completed laboratory for manufacturing development.

alloy with lead for reaction with ethyl chloride to give TEL, is being expanded disproportionately: 50 per cent. The excess sodium will be generally available for non-TEL uses (*CI, Nov., 1949, p. 714*).

Salt handling facilities have been enlarged by increasing brine storage capacity by 425,000 gallons; installation of new filters, evaporators, and dryers; and by new conveyor systems feeding salt to the sodium cells.

A third battery of sodium cells has been installed, and older ones have been redesigned and rebuilt to provide higher capacity. A new electrical substation cost over $1 million, and additions have been made to such electrical equipment as mercury arc rectifiers and transformers. New sodium handling equipment includes two filters of 60,000 pounds daily capacity and two scale tanks holding 70,000 pounds each.

In the chlorine area are four new drying towers, an enlarged scrubbing and purification system, and additional storage tanks.

ETHYL CHLORIDE

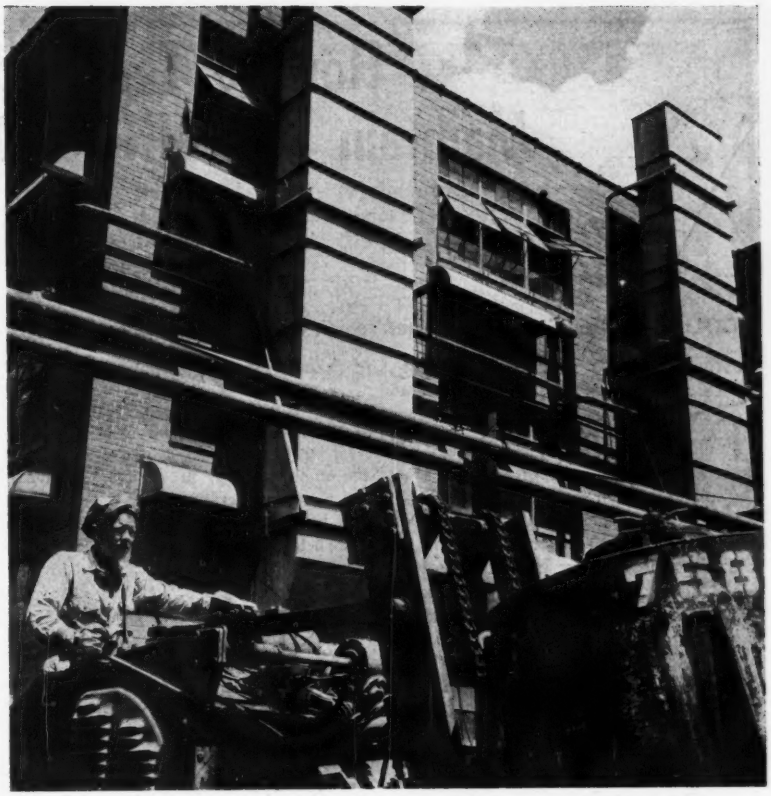
Ethyl's new ethyl chloride unit is its fourth; it cost $3 million. Auxiliary installations include an ethylene dichloride plant (ethylene plus chlorine), three more HCl burners, new ethylene and HCl dryers (ethylene and HCl react to give ethyl chloride), a large water cooling tower, and two additional hortonspheres of 10,000-bbl. capacity for ethyl chloride storage. New HCl, propane and chlorine compressors have been installed, as well as raw material unloading facilities and tanks for storing ethylene dichloride and sulfuric acid. Expansion of water, power, steam and other utilities has, of course, been extensive.

TETRAETHYL LEAD

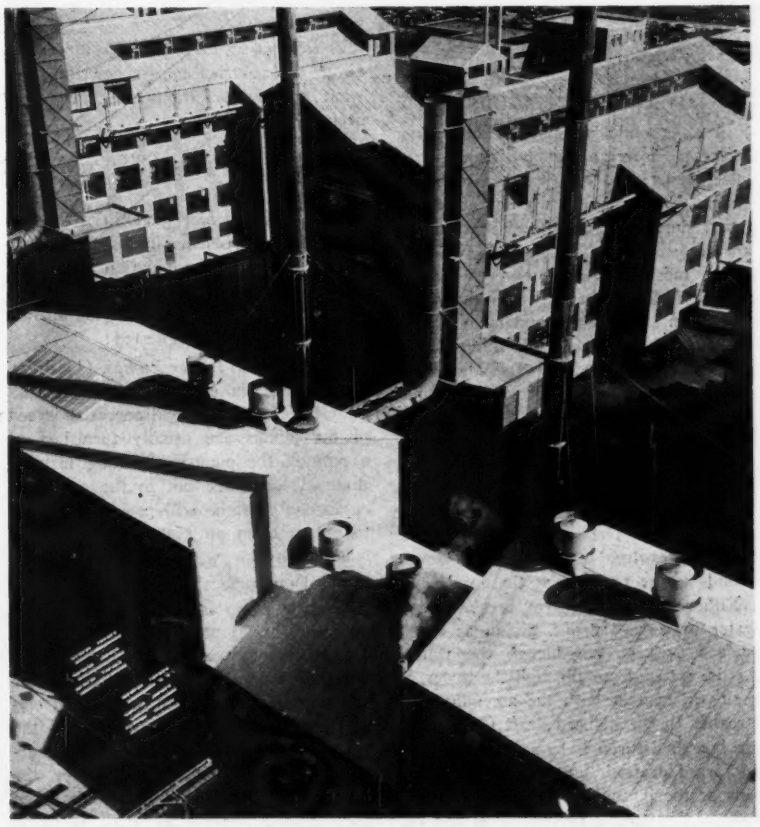
A sixth TEL plant was added to Ethyl's existing facilities. Auxiliary equipment includes a new lead recovery operation, a new wing to the lead-sodium alloy building, additional electric power and a 32,000 gpm water-cooling installation, and a facility for recovering excess ethyl chloride from the reaction with the alloy.

An important TEL function is, of course, distribution. In addition to increased manufacturing capacity, Ethyl has spent some $3 million on new storage and distribution terminals at Edge Moor, Del., and Wilmington, Cal. A new drumming plant and additional tank cars are also part of the enlarged distribution set-up.

Other new non-manufacturing buildings include a plant development laboratory and a medical and personnel building, which also houses some of the plant administrative offices.



A hopper of lead-sodium alloy is carried from new wing of alloy building.



A sixth tetraethyl lead plant was constructed.

How to Test and Maintain COOLING TOWERS

by H. R. BAKER, JR. and G. T. LONG
C. H. Wheeler Manufacturing Co.
Philadelphia, Penna.

COOLING TOWERS conserve water supplies, but improper operation is costly. Here's a scheme for testing and maintaining performance.

THE TRANSFER of heat is as important in the chemical process industries as the transfer of materials.

Cooling is often accomplished through a system which includes a water cooling tower or spray pond, if the plant is situated where a large supply of water is not available. The past few years have seen so many new demands on water supplies, even in regions where water is plentiful, that some municipalities have legislated against unlimited use and discharge of water because of the combined effects of overtaxing the water supply as well as the drainage systems.

The cooling tower enables continued re-use of water, and has permitted many plants to be placed or kept in operation which otherwise either would not have been built, or would have been forced to suspend operations.

THEORY OF OPERATION

In all cooling towers, the hot water enters the tower at the top through the inlet piping into the water distribution system, which may be any one of several types, depending on the design of the tower.

The most commonly used one is the gravity feed system in which the water falls from open flumes and troughs, and splashes over the wood fill until it reaches the bottom. It has the advantages of reducing the pumping costs, using materials of relatively low cost, and of being easy to clean.

Another distribution system is the spray header, made of cast iron or galvanized steel pipe, with bronze or brass spray nozzles. The system operates at a higher pressure, usually six or seven pounds gauge pressure at the nozzles.

Either system serves to break up the water into small drops, giving as much surface area as possible to the water. As the water drops through the tower, it comes in contact with the ascending air stream. In the induced draft towers, the air is pulled through by fans at the top. In forced draft design, air is pushed by fans at the bottom, or, for natural draft towers, the natural movement of the air creates sufficient air currents.

Air passing over the surface of the finely dispersed water evaporates some of the moisture and, in so doing, reduces the water temperature. For the evaporation to occur, the evaporated water must absorb heat, which comes primarily from the balance of the water.

CHECKING OPERATION

Frequently an operating engineer is interested in determining whether his equipment is operating up to par, and this applies to cooling towers as well as other mechanical equipment. The following is a suggested procedure for checking cooling tower performance:

1. *Clean and Inspect the Cooling Tower.* Be certain that it is in proper operating order.

2. *Determine Design Requirements.* From the contract papers determine for what cooling conditions the tower has been designed, i. e.:

GPM.....	CWT.....
HWT.....	WBT.....

3. *Measure Water Quantity.* One of the trickiest problems in testing cooling towers is the determination of water quantity. Two alternate methods (both of which may be available to the operating engineer) are suggested:

a. *Circulating Water Pumps.* (1) Pump performance curves which plot total head vs. GPM for the normal operating speed of the pumps are usually furnished as a part of the pump's operating instructions. If they are not in the operating engineer's files, he will probably be able to obtain them on request to the pump manufacturer.

(2) Determine the total head against which the pump is working by reading pressure gauges at the suction and discharge lines to the pump and calculating the difference. These gauges should be mounted side by side at a common elevation regardless of the position of the lines to and from the pump. Do not attempt to make any correction for the diameters of the suction and discharge lines. This is usually so small as to be negligible.

(3) Enter the pump performance curve with the total head as determined in (2) above and read the GPM of water being pumped. This quantity will be relatively close to the actual figure but will not be exact. This is especially true as the pump increases in age.

b. *Heat Balance.* For this method it is necessary to know the temperatures of the water to and from each heat exchanger involved, and to have an accurate idea of the heat liberated in each exchanger.

4. *Water Temperatures.* Determine temperatures of water at inlet to tower and outlet from tower by use of ordinary mercury in glass thermometers which read accurately to a half degree. In measuring the water outlet temperature be sure that the temperature is determined at such a point as to be representative. If the temperature must be measured in the basin, take several readings and average them.

5. *Wet Bulb Temperature.* Determine the wet bulb temperature of air entering tower. Use a sling psychrometer, following carefully the directions furnished with it. Take this reading at several locations on each side of the tower at the ground level and average these readings. Pay particular attention to the readings on the windward side.

6. *Tabulate Readings.* Fill in the following table of design and test data and compare Test Approach with Theoretical Approach.

Design Test	*Difference*	*Theoretical*
GPM.....		None
Hot Water Temp., HWT	X	None
Cold Water Temp., CWT	X	None
Wet Bulb Temp., WBT..		None
Cooling Range = HWT-CWT.....		None
Approach to WBT = CWT-WBT.....		

Example:

	Design	*Test*	*Difference*	*Theoretical*
GPM	950	1025	+75GPM = +7.9%	X
HWT	100	95	X	X
CWT	87	84	X	X
WBT	78	74	−4°	X
Range	13	11	−2°	X
Approach	9	10	+1	10.9

To calculate the Theoretical Approach, refer to curves A, B & C as follows:

a. The test GPM is 7.9% greater than the design GPM. Read from Curve C the value 1.12.

b. The test Cooling Range is 2° less

than the design range. Read from Curve A the value .92.

c. The test WBT is 4° less than the design WBT. Read from Curve B the value 1.17.

d. Multiply the above factors found in A, B & C above by the design approach.

$$1.12 \times .92 \times 1.17 \times 9 = 10.9$$

This shows a Theoretical Approach to the WBT 10.9°. Comparing this with the design approach we find that the tower is cooling 0.9° closer to the WBT than the theoretical which indicates good performance.

These figures are approximations and are based on average conditions. If, after you have made the suggested comparison, you are dissatisfied with your tower performance, refer to the manufacturer.

HORSEPOWER ECONOMIES

In cool weather, it is often possible to save horsepower in mechanical draft cooling tower operation by one of the following:

1. Reducing fan pitch, thus reducing the air capacity.
2. Operating smaller number of cells.
3. Using the lower speed of two-speed motors.
4. Shutting down fans and depending on natural draft.

Such horsepower savings cut operating costs in cool weather or when low water temperatures obtained by full operation are not required. Balancing additional horsepower costs against those of operating with higher water temperatures is best done by the chief plant engineer, who should decide on the step to be taken. The tower manufacturer will furnish data for special problems.

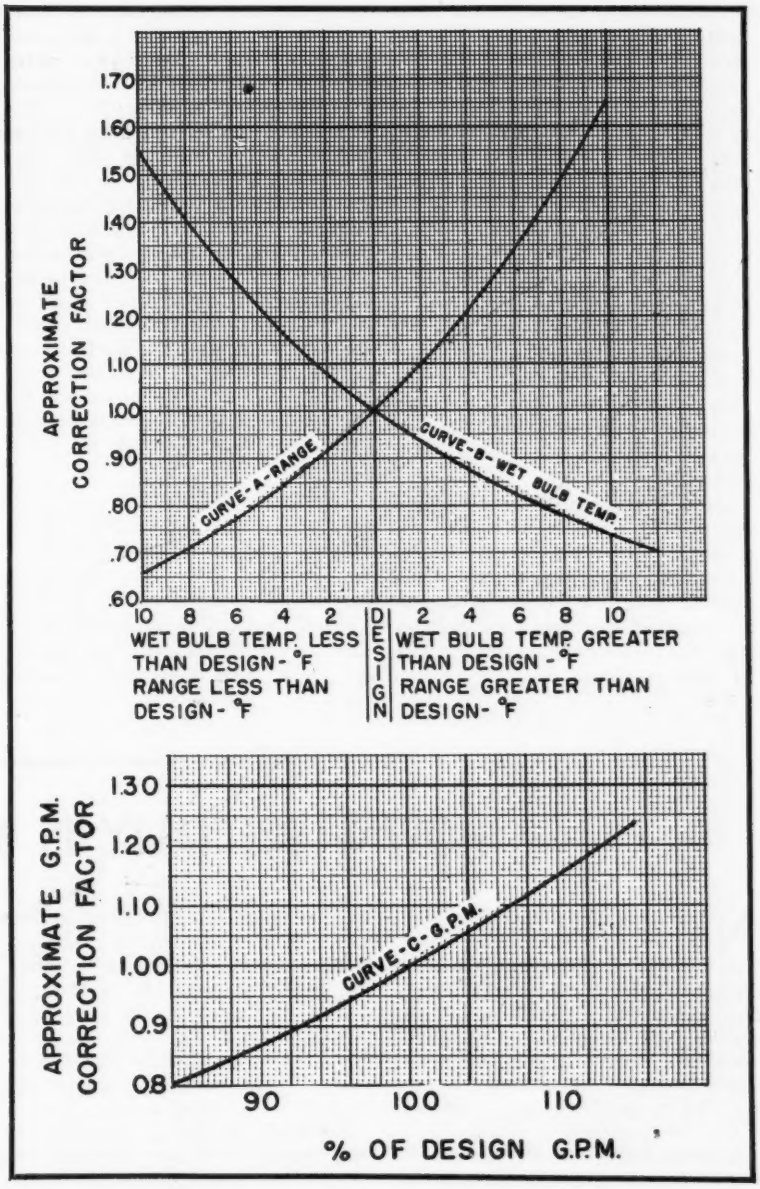
MECHANICAL EQUIPMENT

Principal causes of poor operation of the fan assembly are corrosion, wear and poor lubrication. Regular inspection of the assembly should always include a search for evidences of corrosion and vibration, and a thorough check of lubrication.

Where a tower is in 24-hour operation it is not always practical for a man on each working shift to enter the tower to check the gear reducer, shaft and fan, but such inspection should be made at least daily.

As a guide, the manufacturer's instructions should be followed for checking the oil level in reducer, for greasing the shaft and for changes of oil. The time interval recommended by the manufacturer for changing oil should be followed very carefully.

The motor, being on the outside of the tower, is easily accessible for checking bearing temperatures, lubrication, corrosion or vibration without need of stopping the fan. Motor inspection should be frequent, since troubles with the balance of the assembly often may be detected at the motor. For instance, overloading of the motor could be the result of bearing trouble in the gear reducer.



WATER SYSTEM

With one exception, in the case of exceptionally dirty water, the water distribution system can be inspected at relatively long intervals.

At the bottom of the tower the falling water may be observed either through the louvres or through an access door, available on some towers. The falling water has the appearance of a heavy rainstorm and a quick glance shows whether or not the water is evenly distributed at the bottom of the tower. However, since the wood fill is continually breaking up the larger streams of water, even distribution at the bottom is no indication that it is similarly distributed at the top.

It is necessary to make an actual inspection at the top to determine whether approximately equal amounts of water are emerging from each of the orifices or nozzles. A quick check is made by observing the thickness of the water stream, and the horizontal distance it carries.

Flumes and troughs should be checked for equal water levels, as well as the water distribution to the different cells. Cooling at the design temperature can be accomplished only when water is evenly distributed. If the water is concentrated in one cell of a multi-cell tower, the performance will suffer considerably.

When water is improperly distributed the source of the trouble is usually the clogging of the system by some foreign

matter carried by the water. Mud is the most common offender, sometime supplemented by leaves, sticks, etc.

The method of cleaning the system will depend upon the extent of the clogging. Local cleaning of the individual orifices or nozzles may be sufficient in most cases where only a few ferrules or orifices are blocked.

If the entire system is badly fouled, the use of a fire hose for washing all mud into the basin may be necessary. Draining the waste from the basin is, of course, absolutely necessary in such a case and the general cleaning of the basin also should be done at the same time. High pressure washing should be avoided in redwood basins, since extensive damage may be caused by high-pressure, high velocity streams of water.

Proper flow of water into the discharge pipe must be maintained by keeping the debris screen clean and correctly locating the vortex breaker to avoid both throttling the water flow and sucking air into the circulating water pump suction. This might damage the pump and would reduce the water circulation.

With deep basins, vortex breakers often are not necessary, but if the water level in the basin is only a few inches above the pump suction, the vortex breaker is an important item in basin construction.

It is also important to check make-up water supply to the basin. Water lost from the cycle by evaporation, drift loss, blow down, and leakage is replenished by make-up water. Failure of the float valve, which governs the amount of water added, can cause damage to the entire system. The water level in the basin should be watched carefully, at least twice per eight-hour shift, and the float valve tested at least once per shift. Such a test can be made by hand-operating the valve to see whether raising and lowering of the float respectively shuts off and admits water.

STRUCTURE

Semi-annual inspection of the structure should be sufficient, provided that all defects discovered at that time are promptly corrected. The entire structure should be checked for vibration and all fastenings (bolts and nuts) should be tightened with a wrench to lessen their chances of working loose.

Steel parts which are not galvanized should be repainted at regular intervals whether rust has begun or not. The interval will depend on the quality of paint used and on atmospheric conditions. The semi-annual inspection will indicate how often painting is necessary. Where rust has occurred, the thickness of the sound materials should be determined. If this thickness has been reduced much from the original size, the part should be replaced.

The wood should be checked for soundness, especially in the framework. Most cooling towers are designed to resist 30 pounds per square foot of wind pressure, which is the equivalent of a 100 mile per hour wind. They will continue to resist that wind as long as the framework is in sound condition. (Some advertisements by power or phone companies have shown a pole tester, a penetrating instrument which shows the soundness of the poles at various distances from the surface.) An ordinary icepick may be used for sections believed to be unsound. It is not necessary to punch holes in the entire cooling tower framework, but parts suspected of being weak can easily be tested in this manner.

HOW A SPECIALTY IS BORN

NO SOURCE should be overlooked for new product ideas. They come from the research laboratory, the sales department, customers—even the patent department. The largest share of new chemicals are originated by a company's researchers, but it is natural that chemical specialties—since they are formulated for a specific use—are suggested largely by recognition of a need.

A recent development at Pennsylvania Salt Manufacturing Co. illustrates how a new product idea can come from the current literature. At the time the Pennsalt research staff turned its attention to the development of a cleaner for zinc-based die castings, it was evident that there was serious need for such a product. Current literature dealing with the plating of these castings emphasized that cleaning was the most critical stage in the whole cycle. Some castings that look clean will not take a satisfactory plate.

The staff discussed the proposed development with experts in plating plants and zinc suppliers, hoping that theoretical considerations might be found to limit the extent of the experimental program. It became evident quickly that the great diversity of soils and of cleaning and plating practices would necessitate embarking on a cut-and-try program.

Experimental work began with the study of the effect of individual alkalies used under various operating conditions. The results were interesting and informative, but it was soon learned that pH and degree of alkalinity were major factors that demanded constant consideration. Too low an alkalinity caused etching and a whitish, chalky deposit; while too high an alkalinity caused excessive darkening of the casting. After a practical alkalinity range was established, the effects of the various alkalis within the practical range of akalinity was determined.

Armed with this information and the researchers' knowedge of alkaline cleaning in general, it appeared possible to formulate a cleaner that would be the answer to the platers' problems.

One hundred and ten formulations were prepared and tested before an obviously superior alkaline base for a zinc die casting cleaner was finally hit upon. Then came the question of the wetting agents for the cleaner. Each of the various types of wetting agents was tried, and then effort was concentrated on the types that appeared most promising. Due to synergistic effect it was found preferable to use more than one wetting agent. A combination of wetting agents was worked out that would give excellent detergency, the right amount of foam, etc., and still be inexpensive enough to provide a reasonably priced product. An additional 60 formulations produced a cleaner which, according to laboratory test, was really superior, having good detergent action, good conditioning and other desirable characteristics. This product was designated Pennsalt Cleaner Z-54 according to the Pennsalt nomenclature system.

Over the laboratory development period of 14 man-months, some hundreds of castings had been cleaned and plated. The product appeared to be ready for testing in the field.

Three field trials were arranged and enough Pennsalt Z-54 blended at the Whitemarsh Laboratories to cover these tests. At the first two sites blistering and subsequent rejects were reduced, the plate was superior, the cleaner lasted longer and had better conductivity. At the third test site results were not so spectacular, for precleaning was poor.

A batch was next manufactured at Pennsalt's Wyandotte, Mich., plant for trial sales. The trial sales period has proved the cleaner a success.

Of the two fundamental approaches to sales development—finding uses for a material, and finding a material for a particular use—the latter, it appears from the example, pays dividends in the specialties field.

INDUSTRIAL USES OF VICTOR CHEMICALS

BAKING POWDERS
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CERAMICS—GLASS
EVAPORATED MILK
COOKIES—CRACKERS
COSMETICS
DENTURE CLEANERS
DETERGENTS
DYEING
FLAMEPROOFING
FOOD ENRICHMENT
INSECTICIDES
LAUNDERING
LEATHER TANNING
METALS AND ALLOYS
METAL CLEANING
METAL PLATING
NUTRIENT SOLUTIONS
OIL DRILLING MUDS
ORGANIC CHEMICAL MFR.
PAINT-VARNISH
PETROLEUM REFINING
PHARMACEUTICALS
PHOSPHATED FLOUR
PLASTICS
PREPARED FLOUR MIXES
PROCESS CHEESE
PULP AND PAPER
PYROTECHNICS—MUNITIONS
RUSTPROOFING
SALT
SELF-RISING FLOURS
SOAPS
SOFT DRINKS
SUGAR
TEXTILE PROCESSING
TOOTH POWDER & PASTE
WATER PROOFING
WATER TREATMENT

VICTOR CHEMICALS FOR INDUSTRY

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TRICALCIUM PHOSPHATE
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SODIUM IRON PYRO-PHOSPHATE
FERROPHOSPHORUS
FORMIC ACID
OXALIC ACID
PHOSPHORIC ACIDS
CARBAMIDE PHOSPHORIC ACID
PHOSPHORIC ANHYDRIDE
PHOSPHORUS
PHOSPHORUS OXYCHLORIDE
PHOSPHORUS TRICHLORIDE
POTASSIUM PHOSPHATES
HEMISODIUM PHOSPHATE
MONOSODIUM PHOSPHATE
DISODIUM PHOSPHATES
TRISODIUM PHOSPHATE
TETRASODIUM PYRO-PHOSPHATE
SODIUM TRIPOLY-PHOSPHATE
SODIUM ACID PYRO-PHOSPHATE
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Recent Products from the A & S Packaging Laboratory

SHUR-CLOSE VALVE—Tests made in plants all over the country have proved that SHUR-CLOSE valve bags insure less dusting when packing and less sifting when packed. Consumers are requesting shipments in SHUR-CLOSE valve bags because they prevent waste; while operating men in packing rooms claim SHUR-CLOSE bags eliminate objectionable dust.

STA-STAK BAG—It's the specially designed outer creped sheet that does the trick. STA-STAK creped paper takes the skid and slip out of piling, stacking and palletizing. The STA-STAK construction gives greater resiliency to withstand shocks and general abuse better than ordinary multiwall bags. And they handle easier . . . the crinkly surface provides a handhold that workmen appreciate.

SUPER-GLOSS FLOUR BAG—The SUPER-GLOSS flour bag was developed by the A&S packaging laboratory with the help of the country's largest mills: The long fibered white kraft sheet combined with a blue kraft liner makes the toughest 25 lb. flour bag on the market. The SUPER-GLOSS clay coated sheet gives this bag exceptional whiteness and keeps ink on the surface, producing a sparkling, appealing shelf package.

ARK-TONE PRINTING—A&S has also perfected developments kindred to the field of paper bag making. The new A&S ARK-TONE PRINTING is a case in point. No other commercial bag printing can touch this ARK-TONE process for printing fidelity. Users report increased sales of ARK-TONE printed bags because strong, sharp, clear colors give package greater shelf appeal. ARK-TONE process printing is the only type of commercial bag printing to combine product reproduction and color brightness.

PLASTO-PAK BAG—This is the very latest development from the A&S packaging laboratory. PLASTO-PAK bags have a polyethylene kraft liner which affords completely moisture-proof protection to hygroscopic materials. Many acids and other strong chemicals, when packed in the PLASTO-PAK bag fail to attack the liner. A special "Electro-Seal" (patent applied for) closes off the needle holes at the bottom of the bag . . . no other multiwall has this feature.

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Since 1859, we have been building a fine reputation throughout American industry and are proud of our claim . . . "The oldest name in paper bags." Styles and designs can be copied, but the integrity of a company and the quality built into its products cannot be imitated.

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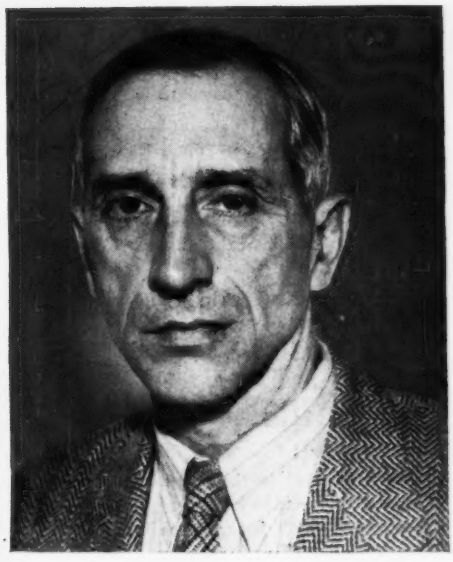
THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

PEOPLE

HERMAN E. RIES, JR., Sinclair Refining Co. Research Laboratories, has been chosen to receive the Ipatieff Prize in Chemistry for 1950 at the ACS spring meeting.

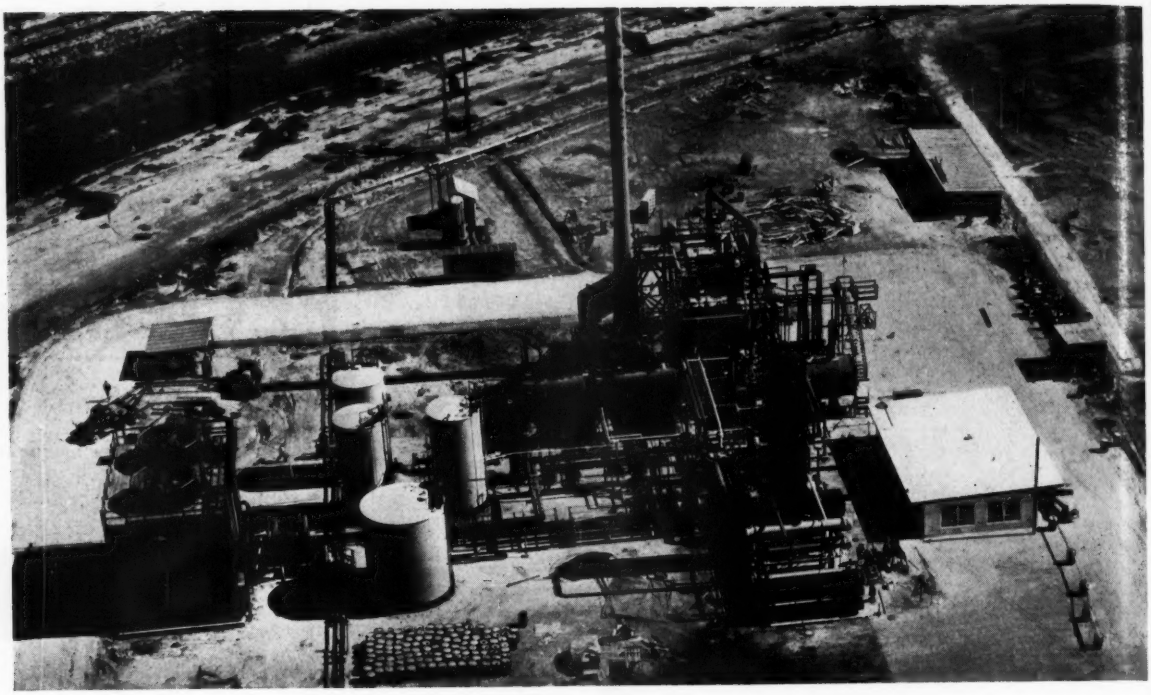


OSKAR WINTERSTEINER, head of the division of organic chemistry, Squibb Institute for Medical Research, will be awarded the ACS William H. Nichols Medal.

JOHN L. GILLIS, elected president of Nealco-Monsanto Co., Boston. He was recently appointed general manager of Monsanto Chemical Co.'s Merrimac Division.

EGER V. MURPHREE, president, Standard Oil Development Co., has been awarded the American Section of the Society of Chemical Industry's Perkin Medal for 1950.

WALTER J. MURPHY, ACS editor, chosen to receive the American Institute of Chemists' 1950 gold medal.



Over-all view of Hancock Chemical Co.'s sulfur recovery plant at Long Beach, Calif.

Sulfur From Refinery Gas

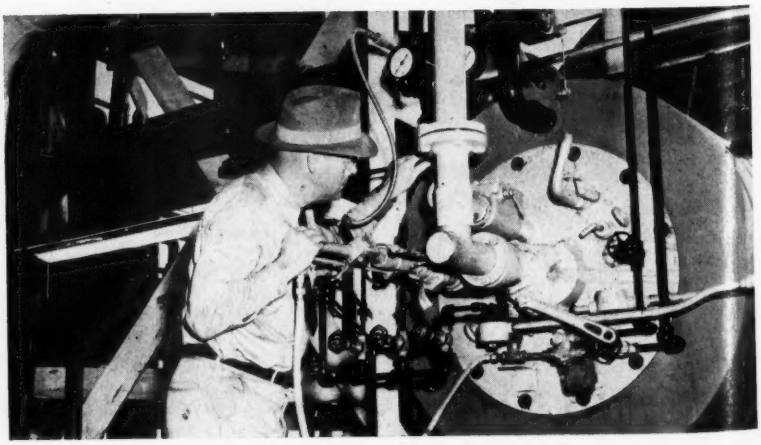
The first plant in this country to recover sulfur from the hydrogen sulfide in waste petroleum refinery gases was put on stream last March in Long Beach, Calif., by the Hancock Chemical Co., a subsidiary of Hancock Oil Co.

The gases are scrubbed in towers, located at the refineries of Richfield Oil Corp. and The Texas Co., by a countercurrent flow of diethanolamine. The solution is piped to the Hancock plant where it is steam-stripped. The H_2S vapors are burned with a deficiency of oxygen so that only part of its is converted to sulfur dioxide. The latter reacts catalytically with the rest of the H_2S vapors to give a 98.5% yield of elemental sulfur. The molten product is tank-trucked to the near-by Stauffer Chemical Co. plant for conversion to sulfuric acid.

The Richfield gases yield about 28 long tons of sulfur a day, and the Texas Co. gases, 14 long tons. Hancock is currently expanding its plant to handle gases from the General Petroleum Corp. refinery. This will approximately double the present output.

Hancock is also investigating other petroleum sulfur sources—even crude oil itself. Success in these efforts would free the West Coast from dependence on Texas and Louisiana sulfur.

At control panel are Plant Manager H. Gribbons and President W. T. Hancock.



Sulfide burner, by which hydrogen sulfide is converted to sulfur by partial combustion.

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IN CANADA: Delta Chemical Works Corp., Brantford, Ont.

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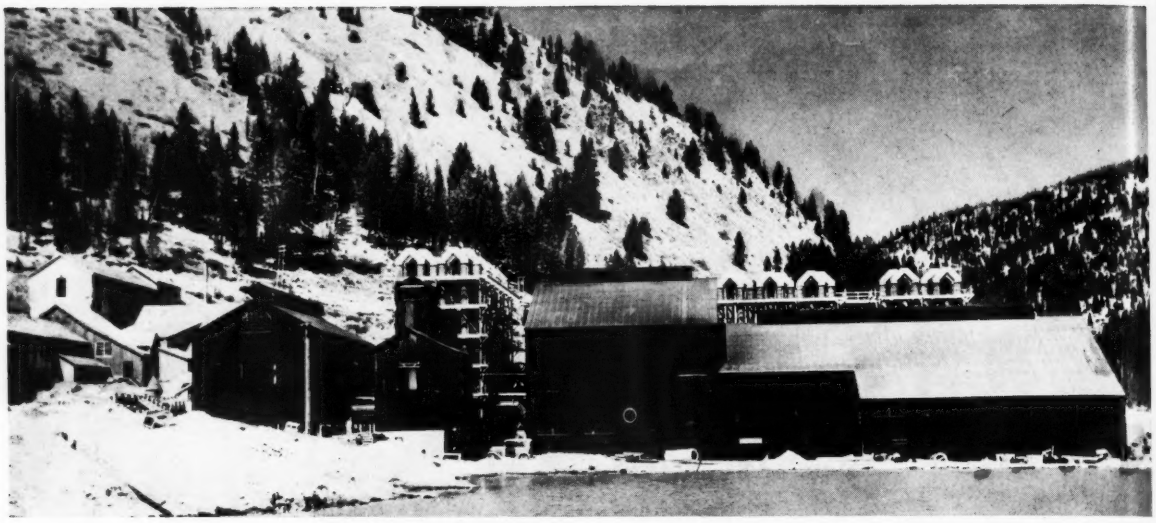


New antimony smelter of 9,000 tons antimony oxide per year capacity.

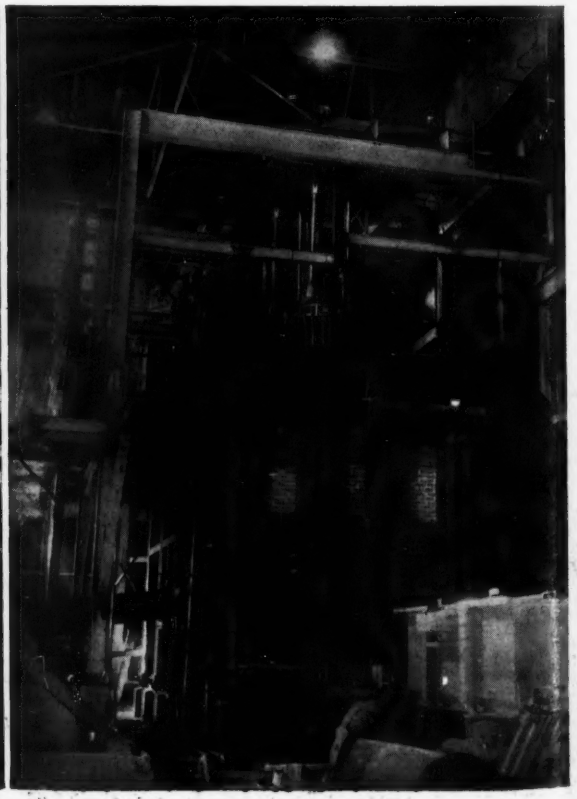
New Source of Antimony Oxide

The Bradley Mining Co. of San Francisco has just put into operation a new of antimony oxide and metal at Stibnite, Idaho. The smelter is capable of producing 9,000 tons of antimony oxide per year.

Concentrates from Stibnite formerly were shipped to Harshaw Chemical Co.'s El Segundo plant for processing. In the new arrangement the antimony ore will be processed at Stibnite and only the finished antimony shipped. Harshaw is the exclusive sales agent for Bradley's antimony oxide.

The processing of the ore, which contains gold, silver, and arsenic as well as antimony, is a complex process involving a two-step froth-flotation process, roasting, reduction in a 2,000 KVA electric furnace to a crude antimony containing precious metals, refining of this metal, and finally air-blowing of the molten metal to volatilize antimony oxide in pure form.

Froth-flotation refining of ore, first step in the refining process.



Electric furnace for the reduction of roasted ore to crude antimony.

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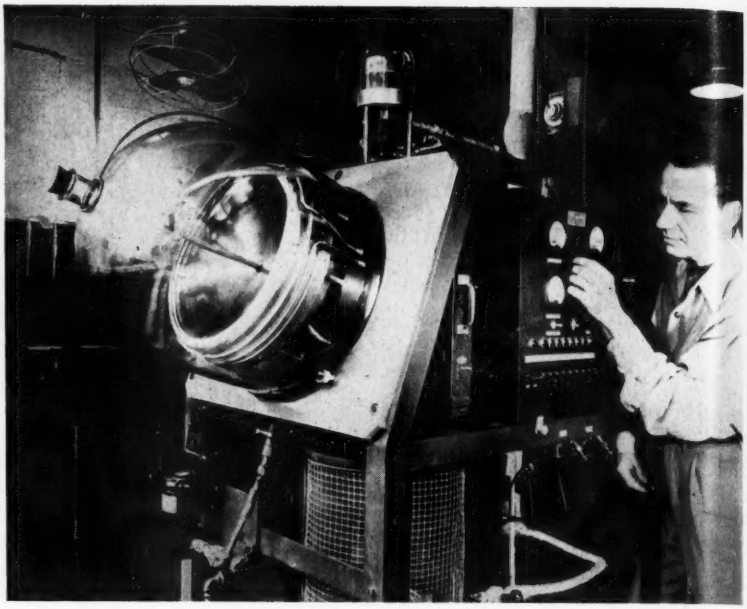
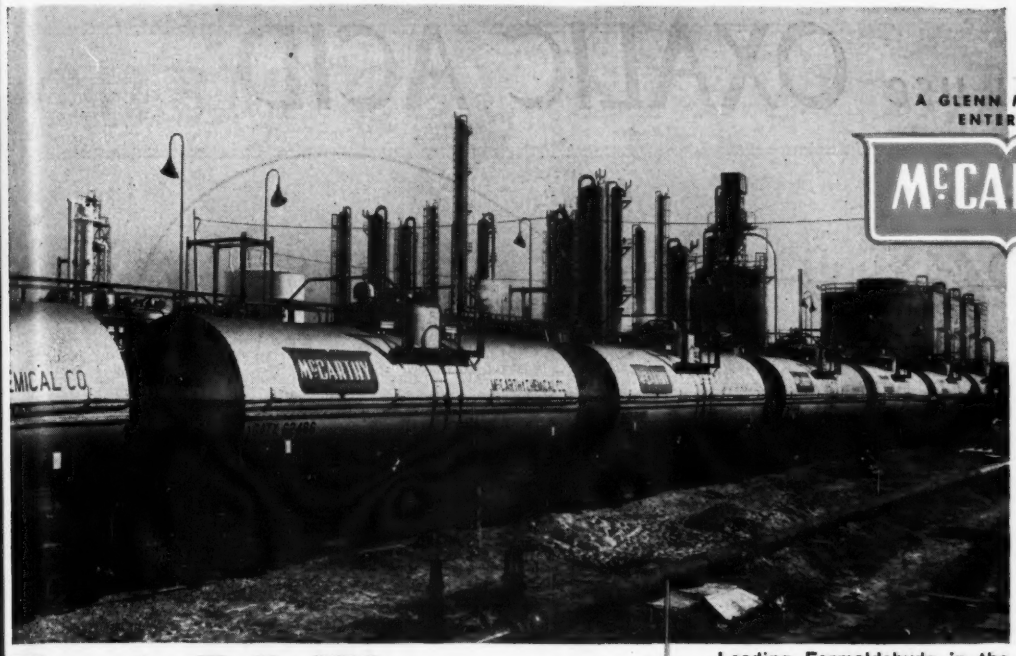


A new petroleum research technique promising to make possible the manufacture of better lubricants has been put into operation at the Beacon Research Laboratories of the Texas Co. Known as molecular distillation, this technique provides hydrocarbons not previously available and enables the chemist to determine what hydrocarbons make good oils.

The entire process is conducted in almost a perfect vacuum. The liquid is spread out in a thin layer and exposed to the heat of distillation for less than 1/10 of a second. Thus decomposition of the hydrocarbons is held to a minimum —very important since exposing material to heat for an appreciable period may seriously change its molecular structure.

New Mimeograph Plant

A. B. Dick Co. has recently opened a 13-acre, single-story plant at Niles, Ill. The plant's principal production operations fall into two categories: metalworking, finishing, and assembly operations for the manufacture of duplicating machines; and the production of stencils, inks and other chemical specialties for mimeograph operation. Above is part of the stencil manufacturing activities. The heat and vapors produced by the equipment are exhausted directly to the outside.



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Loading Formaldehyde in the 10,000 gallon tank cars operated by McCarthy. Each car is especially lined and insulated.

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PFIZER

Manufacturing Chemists Since 1849

Petroleum Waxes Extend Specialty Uses

by FRED W. PADGETT and JOHN W. PADGETT
Moore & Munger, New York, N. Y.

LOW COST, AMPLE SUPPLY from domestic sources, and a wide range of desirable properties make petroleum waxes important materials for specialties manufacturers. Knowing their properties and applications aids in proper selection and formulation.

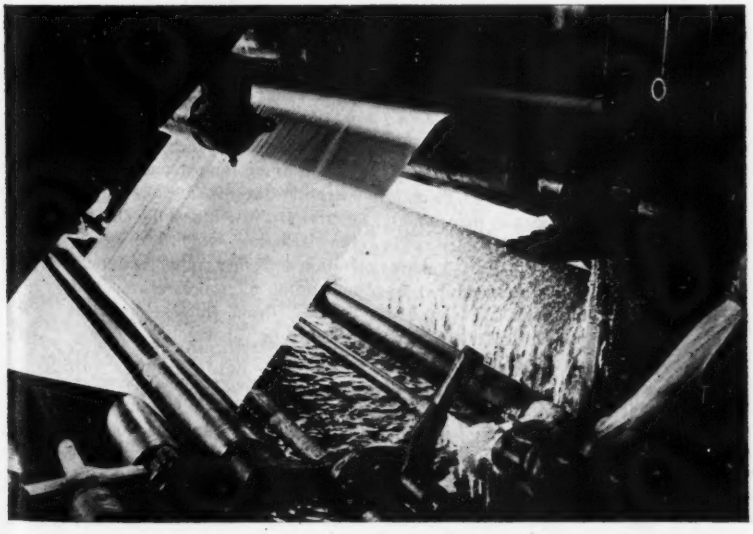
PETROLEUM WAX is a byproduct of the petroleum industry in that it must be removed from oils to produce lubricants with proper low-temperature characteristics. This gives it the advantage of a low price, but does not mean it is a material that must be taken in an "as is" condition for utilization in any desired application.

The requirements of consuming industries and the progressiveness of refiners have combined to result in a wide range of products adaptable, either alone or in formulations with other materials, to many uses. Some of the applications in which specialties manufacturers are interested include laminating agents, coatings, waterproofing agents, polishes, cosmetics, inks, modifiers for other waxes, carbon paper, impregnating compounds, sizes, leather dressings, etc. While large quantities of petroleum waxes are used without modification for many uses, the trend is toward formulation. Hence, an understanding of both the grades and properties of available waxes, is necessary for intelligent selection of a suitable material by a manufacturer.

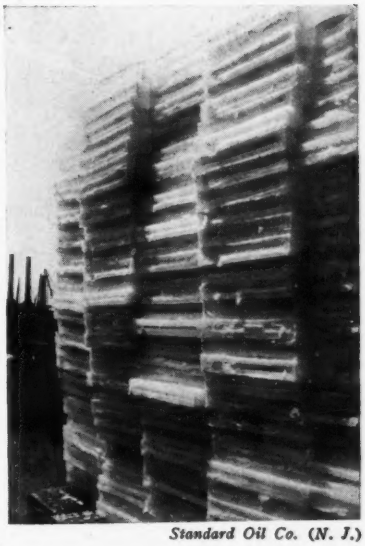
TYPES

Following are the various types of waxes produced in American refineries:

(1) Paraffin Waxes
  (a) Sub-scale waxes
  (b) White and yellow scale waxes
  (c) Fully refined waxes
(2) Petrolatum
(3) Microcrystalline waxes (micro waxes), sometimes designated as petrolatum waxes, amorphous waxes, petroleum ceresines and petroleum ozokerites.



Molten wax is deposited on paper sheet as it passes through wax bath.

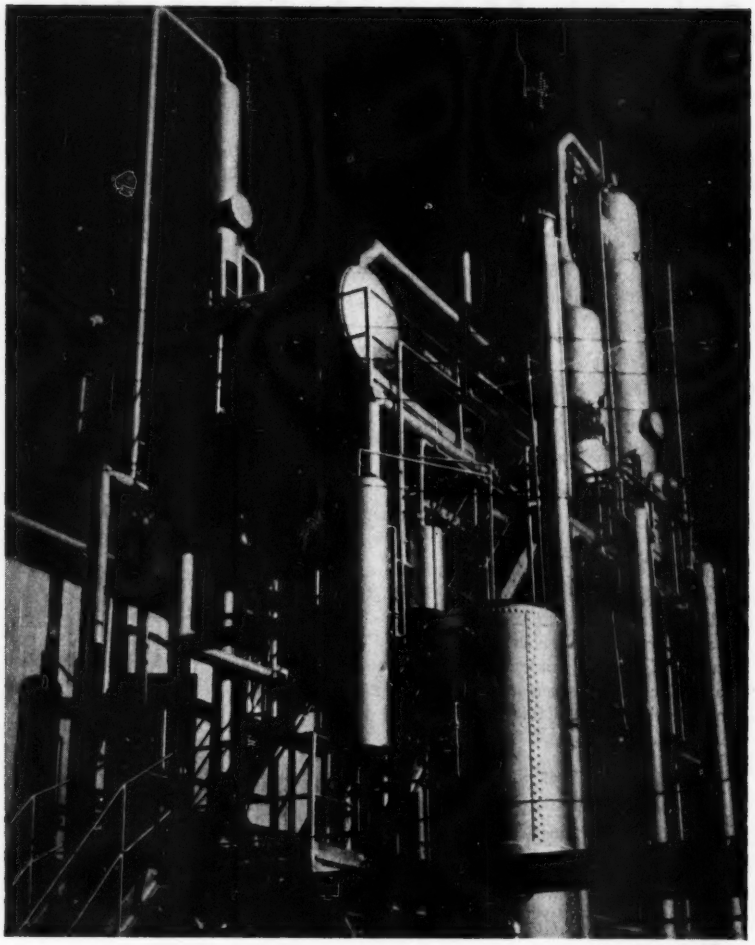


Standard Oil Co. (N. J.)

The above products are typical hydrocarbon waxes. Imported ozokerites and ceresins also are hydrocarbon waxes but have been largely displaced by products made in this country. High-melting point wax (petroleum ceresine types) is made in this country from oil field tank settlings, well cleanings and rod waxes, as well as from crude oil in refinery operations. It is also mined from mineral deposits in Utah.

Sub-scale waxes contain more oil than scale waxes, but, because of special formulation, may not sweat this oil as readily as might be expected. Melting points usually are between 122 and 140° F. Scale waxes often contain 1.50 to 4.0% oil, have negligible tensile strength, and the melting points usually are between 118 and 135° F. Fully refined waxes usually contain less than 0.4% oil and often less than 0.2%, and have melting points generally between 120 and 160° F. Tensile strengths vary from 120 to 450 lbs. per sq. inch at 70° F. The latter are nearly "water white," and possess very little odor or taste.

Semi-refined wax, which is rarely encountered on the market, perhaps should be mentioned, although it is hard to de-



Sun Chemical Corp.

Solvent de-oiling unit for micro wax production at Warwick Wax Co.'s Chanute, Kansas plant.

fine. Such waxes may be special scale waxes, or products intermediate in tensile and other properties between scale and fully refined.

Petrolatum, because of its high oil content, is largely limited to cosmetic and pharmaceutical applications, although it is also used as an additive to impart ductility to wax formulations. Hence, it will not be discussed in detail in this article. U.S.P. petrolatum is commonly used alone or as a base for ointments, and the material is used as an ingredient in hair preparations and similar formulations. Added to blends of paraffin and micro waxes, petrolatum yields products with a range of ductility. It has a number of minor applications of which lubrication is one.

Microcrystalline waxes include soft—sometimes greater than 30 penetration (*Note:* the higher the penetration, the softer the wax)—through medium and hard, the last mentioned being as hard as 2 to 5 penetration at 77° F. Colors of the microcrystalline waxes vary from black and dark brown, through red, yellow to some nearly white; the melting points may be as high as 190-200° F., while the oil contents usually vary between 1.0 and 15.0%. They are often but not necessarily of high tensile strength.

DIFFERENCES BETWEEN MICRO AND PARAFFIN WAXES

The average melting point of paraffin waxes is lower than micro waxes. Paraffin waxes have the property of forming or growing larger crystals than micro waxes; in some cases, the difference is much more pronounced than others. Paraffin waxes can be manufactured by the sweating process, which involves oil drainage from among the crystals accompanied by fractional fusion and can even be rendered oil free by sweating, which indicates that the crystals in paraffin wax do not adsorb or occlude oil in their formation.

Since the stocks from which the micro waxes are made are not amenable to sweating, this fact and others suggest that the crystals of some of the micro waxes have a greater tendency to occlude or adsorb oil. The micro waxes are not true amorphous waxes, but are more nearly approaching this condition than the paraffin waxes. The crystals in the paraffin waxes are of the plate and needle variety while in the micro waxes they tend toward malcrystallization or ill-formed crystals. Paraffin waxes have an unctious or greasy feel, while the micro waxes tend to be resinous or tacky.

The non-oily portion of the paraffin waxes consists predominantly of normal paraffins, but in the micro waxes, the iso-paraffins and hydrocarbons other than normal paraffins become more pronounced, and asphaltic matter and traces of resinous materials may be present. The molecular spread also influences the properties of both paraffin and micro waxes; thus they may be "close cut" (having constituents with molecular weights varying over a narrow range), "wide spread," or even variable as to the ratio of high, low and medium constituents.

These differences between micro and paraffin waxes naturally dictate the ways in which they are used. The presence of oil adds ductility or plasticity to a wax, but it must be retained, and must not sweat out. It would be very undesirable, in general, for a laminating or coating wax, for example, to bleed oil with the passage of time. Where the properties imparted by oil are required in a formulation, a micro wax or a micro-paraffin blend should be used. The addition of micro to paraffin will take up the oil from between the paraffin crystals, tending to cement them together and thereby improving tensile strength and ductility. The oil will be occluded by the micro wax, and will not make its unwelcome appearance on a finished product.

MANUFACTURE

Many paraffin waxes are still made by a process which includes sweating the slack wax secured by filter pressing a chilled, wax-containing oil distillate of low viscosity. In some refineries, the slack wax is made by dewaxing the oil by means of solvent and finishing up by sweating the slack wax; in others, the entire process, including the deoiling of the slack wax, is done with solvent. Filtration equipment in general includes plate and frame filter presses, and rotary continuous drum filters operating under pressure or vacuum.

Micro waxes are recovered from viscous distillate, residual petrolatums and oil field residues by solvent methods, utilizing centrifuges or rotary continuous filters. The solvents mainly used in dewaxing and deoiling are methyl ethyl ketone (mek) mixtures with benzene and toluene, mek alone, naphtha alone, or propane alone.

Antara Products
General Aniline & Film Corporation

Antara Extra

An Antara Products Publication

Detergents
Emulsifiers
Wetting Agents
Dispersants
Carbonyl Iron Powder

444 MADISON AVENUE NEW YORK 22, N. Y. DECEMBER, 1949

TEN NEW ANTARA PRODUCTS INTRODUCED AT EXPOSITIONS

Ten new products were displayed by Antara Products, General Aniline and Film Corporation, at the East and West Coast chemical shows.

Antara Products showed products and applications through a unique exhibit with color transparencies, first at the San Francisco Chemical Exposition November 1 to 5, and second at the Exposition of Chemical Industries, Grand Central Palace, New York City, Nov. 28th to Dec. 3.

Products on display were Carbonyl Iron Powder, a remarkably pure form of iron used extensively in high frequency electronic cores, and nine surface active agents which have a host of wetting, detergent, emulsifying and dispersing applications.

Surface active agents shown were: Antarox A-200 and A-400, two stable, liquid non-ionics; Antarox B-100, D-100 and B-290, three versatile emulsifiers; and Antaron L-520, L-135, L-245 and L-114 – anionic powders and gels with varied uses from general cleaning operations and the manufacture of specialty cleaners to the formulation of special products with detergent, wetting, emulsifying and dispersing properties where foam is undesirable.

Unusual New Synthetic Detergents Booklet Offered

A new, descriptive folder said to be the most unusual and revolutionary of its kind ever printed has been issued by Antara Products, General Aniline & Film Corporation, 444 Madison Avenue, New York City. Entitled "Synthetic Detergents – Their History & Applications", the new folder is written in non-technical language and designed to acquaint laymen buyers with simple facts about these materials.

The folder defines both detergents and synthetic detergents and explains the need for the latter in industry, home, textile field, cosmetics, insect and weed killers, institutional cleaning, community life and in thousands of other places where their outstanding properties help make better products at lower cost.

The three general types of synthetic detergents – anionic, cationic, and non-ionic – are explained, along with the advantages of each type.

An easy-to-use chart gives the name, type, family and uses of 19 Antara Products Surface Active Agents known as Antarox, Antaron and Antarane.

Copies of the folder may be had by writing the company.

Canadian Company Set Up To Make Non-Ionics

A new Canadian company for the manufacture of synthetic non-ionic surface active agents has been formed in Toronto, according to Jack Frye, President of General Aniline & Film Corporation.

Known as Chemical Developments of Canada, Ltd., the new company is jointly owned by General Aniline & Film Corporation and Standard Chemical Co., Ltd., Canada.

The Canadian organization will manufacture organic chemicals based upon "know-how" and assigned patents of General Aniline & Film Corporation.

Many of the proposed products have not been produced heretofore in Canada.

The wide experience of General Aniline & Film Corporation in the chemical field will enable the new Canadian company to escape many of the problems normally attending initial manufacture and should insure its rapid progress to an established place among the chemical industries of Canada.

Until these surface active agents are being produced in Canada, they will be available from the United States through the Standard Chemical Company, Ltd., in Canada.

FROM RESEARCH TO REALITY
GA
Antara Products
GENERAL ANILINE & FILM CORPORATION
444 Madison Avenue
New York 22, N. Y.

Whether or not sweating will long resist the impact of solvent methods remains to be seen, but sweating has never been carried out efficiently but in a few refineries, and hence has not had the chance it deserves as far as paraffin waxes are concerned.

Treatment with strong sulfuric acid followed by sludge removal and neutralization, and the use of adsorbents such as fuller's earth, bone char, and activated bauxite, are refining methods still customary somewhere along the line in the production of many of the waxes.

TESTING AND EVALUATION

Refiners, distributors and users all carry out tests on waxes before shipment, sale or use. Methods will be discussed here only briefly, along with interpretations.

Melting Point: The melting point is considered in relation to the temperature to which the finished wax-containing product will be exposed. An insulating coating for an electrical coil, for example, might require a wax with a melting point of 160° F., while candles are formulated with a wax melting much lower.

The ASTM (D87-42) and I. P. (Institute of Petroleum), British (55/42) methods for paraffin waxes consist essentially in finding the minimum rate of temperature change when the wax cools from liquid to solid. The Moore and Munger Method checks with the above and consists in securing a cooling curve on a graph from a resistance thermometer and calculating the melting point from the curve.

The melting points of micro waxes are determined by the drop point (ASTM D127-30), the ring and ball softening point, or the softening point found when a sample of the wax in a glass tube immersed in water, moves upwards when the water is heated.

A rapid and reliable method of finding the solidification point of any wax consists in revolving slowly a horizontally held thermometer on the bulb of which is located a drop of the wax; when the wax solidifies the temperature is read.

Hardness: Whether one wants a hard wax or soft wax depends upon the use intended for the end product. In selecting a wax for a floor polish, hardness would be one of the main considerations. Laminating or some coating and impregnating agents, on the other hand, would call for a soft wax.

Tests are significant for both paraffin and micro waxes. Needle penetration (ASTM D5-25) is used almost universally for testing micro waxes but is not satisfactory in testing paraffin waxes. The hardness of paraffin waxes is determined in the Moore and Munger laboratory by means of the Abraham Consistometer which, although the technique is somewhat involved, has been found quite satisfactory through more than ten years of use; the results are precise, have a sound fundamental basis, and are pleasingly reproducible. The Consistometer also should have valuable applications in connection with micro waxes.

Oil Content: Proper balance of oil content is necessary for ductility. Paraffin and high melting point petroleum ceresine types should have a low oil content as it affects their tensile strength and texture.

The press method has been considered obsolete for many years and has been replaced by the mek solvent method, developed by the Socony Vacuum Laboratories especially for paraffin waxes (ASTM D721-47). When testing micro waxes for oil content many laboratories prefer solvents other than mek, ethylene dichloride at 0° F. being the favorite.

Tensile Strength and Modulus of Rupture: Determining the load required to break a specimen has been a method of testing fully refined wax for the past twenty years. For such applications as coatings for milk cartons or some potting compounds for electrical accessories, high tensile strength is necessary. However, in impregnating textiles or waterproofing paper, for example, high tensile is not required, since the wax is not applied to the surface as a coating but is driven into the body of the material.

The Perkins and Tinius Olsen wax tensile machines are the ones used most extensively in testing by refineries and paper companies. Tensile strength of wax has not as yet been subject of a standard method by ASTM or TAPPI (Technical Association of Pulp and Paper Industries), but is being studied with that end in view.

Modulus of Rupture is the force necessary to break a rectangular or round specimen resting horizontally on two fulcri; the force is applied vertically downward at the middle of the bar. It is quite closely related to tensile strength and the same considerations in selecting waxes for given applications apply. Another similar test, called the Indiana Coating Index, recently has been developed by the Standard Oil Co. of Indiana.

The subject of Tensile Strength and Modulus of Rupture has been reviewed by Padgett and Kilingsworth.[1]

Blocking: The tackiness, or tendency of waxed articles to stick or fuse together, is known as blocking. This is of primary importance in connection with wet-waxed sheets. The test method is to superimpose a number of sheets and weigh them down in an oven at a definite temperature. Following an equilibrium period the sheets are removed and after cooling are tested by pulling apart to estimate the force of adhesion and the surface picking or fusion.

[1] Padgett and Killingsworth, *Paper Trade Journal*, May 9, 1946.

PROPERTIES OF COMMERCIALLY AVAILABLE PETROLEUM WAXES

Refinery	*M. P. ASTM D-127-30*	*Viscosity at 210° F. Sayboli Universal*	*Penetration ASTM d5-25 100-77-5*	*Color*
			GROUP A	
1	155 min	75/100	25/35	Amber (4NPA*) and Brown
1	165 min	75/100	25/35	Amber (4NPA) and Brown
2	155/160	71	25/35	Light Amber—Brown
2	150/155	73		Brown
4	155 min	75/85	45/60	Dark Olive
4	155 min	75/85	25/35	White—Light Yellow
4	155 min	75/85	35/40	Amber
4	145 min	70/80	70/80	Dark Olive—White
5	145	75/85	18/22	#1 White, #2 White, Cream and Amber
5	155	75/85	10/20	#1 White, #2 White, Cream and Amber
5	165	75/85	10/20	#1 White, #2 White, Cream and Amber
6	167	70/75	24/26	6/7 Max Lovibond†
8	165	60/70	15/25	5/10, 30/40 and 150/200 Lovibond
8	155	60/70	25/35	5/10, 30/40 and 150/200 Lovibond
			GROUP B	
1	190/195	75/100	2/7	White—Amber (2NPA)—Black
3	180/185	80/85	6	4½—6 NPA
3	180/185	80/85	8	5½—8 NPA
3	190/195	80/85	5/10	2½—3 NPA
3	195/200	80/85	2 Max	2—2½ NPA
10	195/200	83/88	3/8	Black—2–2½ NPA
		85/90	3/8	5/7 NPA
			GROUP C	
1	170/175	75/100	15/20	White—Amber (1½ NPA)
5	170	75/85	10/20	#1 White, #2 White, Cream and Amber
5	175	75/85	10/20	#1 White, #2 White, Cream and Amber
6	166	70	15/25	150/200 Lovibond
6	166	70	15/25	3 Max Lovibond
7	170/175	55	11	Yellow—Bleached
7	170/175	55	15	White
7	165/170	55	23	Bleached
7	165/170	63	11	Yellow—White
8	170 min	60/70	10/15	5 NPA Max, 30/40 and 150/200 Lovibond
9	170/185	80/100	15 max	2½ NPA—Brown NPA
			GROUP D	
11	143/150	50		White
	160/165	50		White

* National Petroleum Association color scale.
† Lovibond tintometer compares color with a standard series of tinted glass slides.

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Iso-Octyl Alcohol—$C_7H_{15}CH_2OH$
Isopropyl Acetate—$(CH_3)_2CHCOOCH_3$
Secondary Butyl Acetate—$CH_3(C_2H_5)CHCOOCH_3$
Isopropyl Ether—$C_3H_7OC_3H_7$
Acetone—CH_3COCH_3
Methyl Ethyl Ketone—$CH_3COC_2H_5$

ENJAY HYDROCARBONS

Butadiene—$CH_2{:}CHCH{:}CH_2$
Isobutylene—$CH_2{:}C(CH_3)_2$
Diisobutylene—$CH_2{:}C(CH_3)CH_2C(CH_3)_3$ and $(CH_3)_2C{:}CHC(CH_3)_3$
Triisobutylene—$CH_2{:}C(CH_3)CH_2C(CH_3)_2CH_2C(CH_3)_3$†
Tetrapropylene— $C_{12}H_{24}$
Cyclohexane—C_6H_{12}

† *Other isomers also present.*

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The operation is repeated at increasing temperature intervals to find where blocking occurs; some specifications require that the sheets not block at some certain prescribed temperature or below. The TAPPI organization has established a standard for the test.

Sealing Strength: Strength of seal may be of fundamental significance in sheets waxed with either paraffin or micro waxes. Fully refined waxes on wet-waxed sulfite sheets usually provide passable seals, which can be, and should be, improved by means of additives. Some of the micro waxes provide very strong seals on both sulphite and glassine. The method of testing involves controlled sealing of two sheets together and after aging, measuring the force necessary to pull the sheets apart. The methods and forms of apparatus used in various laboratories differ considerably, but the Packaging Institute has set up a generalized standard. The method used in the Moore and Munger laboratory is a graphical one designed especially for research, is quite reproducible, and will detect very small differences.

Moisture Vapor Transmission: The reason that petroleum wax is used so much in packaging is because of its fundamentally high resistance to water vapor penetration. While two waxes may have the same basic water vapor resistance they may be different in practice because of difference in brittleness, permitting breaking at the folds, or because they are applied differently or on different sheets. For example, a dry waxed sheet is much lower in water vapor resistance than a wet waxed sheet, because the wet waxed sheet contains more wax and has a more or less continuous appreciable film of wax on the surface over the fibres. The TAPPI organization has set up test standards for various conditions.

Other Tests: Odor or odor stability under liquid storage conditions is important in some applications—for example, in breadwrapper. Gloss and gloss stability on wet waxed sheets also are not to be neglected. Some waxes provide good gloss and improve with time, others provide good initial gloss but do not age well. Taste of wax is considered significant in some uses.

The carbonization or sulfuric acid test is required in some specifications. Fractionation of the waxes by distillation or solvent separation, often provides information of practical value, as do specific gravity and refractive index determinations. Corrosion resistance tests, and ash contents of micro waxes are included in some specifications, as are viscosity limits. (Viscosities of micro waxes average higher than those of paraffin waxes.)

Stain tests are important for some applications of micro wax. Flexibility, ductility, flaking tendency, or loss of sealing strength at low temperatures are significant properties where the wax is to be used for frozen foods.

Specifications: Federal departments have set up specifications for paraffin and micro waxes; so have the USP, the Toilet Goods Association and others. These specifications are numerous, subject to periodic change, and space does not permit their being reproduced here.

WAX FORMULATIONS

Large quantities of petroleum waxes are used in commercial applications without modification, but the trend is toward formulation. For example, up to the present time, the wax used on sulfite breadwrapper has been straight high-grade fully refined wax, but it is safe to predict that the greater percentage of breadwrapper wax within the next few years will be formulated.

A minor proportion of some organic material such as polyisobutylene, ester gum, terpene resins or I.G. waxes, may be added to petroleum wax to improve certain properties, such as sealing strength, resistance to blocking, or gloss. On the other hand, a minor proportion of petroleum wax in another organic commercial substance may serve to improve its water vapor resistance or other properties markedly. Petroleum waxes in small percentages in rubber, for example, inhibit sun checking.

Petroleum waxes are miscible or compatible with many but not all organic materials. In the field of resins, compatibility is variable; resins such as ester gums and the polymerized terpene types usually provide excellent dispersions which remain in suspension at temperatures down to and below the melting point. Such formulations are used in paper and textile coatings, paints, and waterproofing treatments.

Oils of the hydrogenated cottonseed, soybean and fish oil varieties are readily soluble and these formulas are used for candles and cosmetics. Hydrogenated castor oil, however, is miscible only within limits. Formulations of it give anti-blocking, hard coatings. Asphaltic materials show compatibility within limits depending upon the nature of the asphalt, and require a third substance such as pitch, to bring about miscibility. Asphalt also has been used as an oxidation inhibitor in petroleum waxes. These formulas are used for dip coatings, potting compounds and the like.

Compatibility of petroleum waxes with other substances in the last analysis, often can be brought about by a suitable third substance. Natural rubber, polyisobutylene and butyl rubber can be brought

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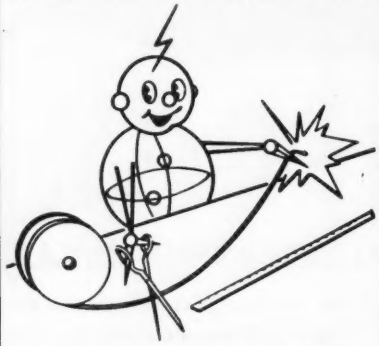

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Metalloy engineers developed this new ribbon-form at the request of volume users in the synthetic organic field. Formerly, these same engineers pioneered the manufacture of Lithium metal in the form of wire, shot, rod and cup.

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into suitable colloidal dispersion in waxes by milling and/or by special mixing machines. These mixtures are widely used commercially for waterproofing, laminating, coating, etc. Polyethylene can be brought into solution by suitable mixing methods but instead of forming a fine dispersion like rubber or ester gum, it separates at a definite temperature depending upon concentration and molecular weight. Polyethylene will improve tensile strength, toughness, gloss, sealing strength, and blocking resistance in petroleum wax formulations.

Waxes like carnauba, beeswax and candelilla go into solution readily, and petroleum waxes are commonly used as extenders for these materials in polishes and cosmetic products. Mixtures of petroleum waxes with other organic materials, however, often result in large viscosity increases which may complicate application methods depending upon low viscosity and high speeds.

Highly refined paraffin waxes are used in the manufacture of chlorinated waxes. Waxes of low oil content are required in these products to insure good stability. They are generally used as flame retardants and in high pressure lubrication.

EMULSIONS

Besides being applied directly in molten condition, petroleum waxes are used extensively in emulsion form. An important use of wax emulsions is in the sizing of paper and paperboard. Scale wax, refined wax, and micro waxes go into these applications.

In the internal sizing of paper, the wax often is mixed with rosin and the emulsifying agent may consist of rosin salts. The emulsion is applied to the beaters, before the pulp goes to the machines. In surface sizing, the wax emulsion is applied at the machine from a tub, or at the calenders. Sizing increases water and scuff resistance, besides having other advantages.

Petroleum waxes also are found in polish emulsion formulations. Other common uses for emulsions are showerproofing fabrics, application to nursery stock to prevent desiccation, and coating of fruits and vegetables to inhibit desiccation and improve appearance.

Permanent emulsions from straight petroleum waxes are more difficult to formulate than those from waxes like carnauba, ouricuri, candelilla and beeswax, and often require special study of conditions, formulation, and emulsifying agents. Recently, oxidized high melting point petroleum waxes have been introduced for use both as a wax and an emulsifying agent in conjunction with suitable alkalis, but they are most effective when formulated with other waxes.

PRINCIPAL USES

The following is not intended to be a detailed discussion but more to indicate in a general way the principal uses and at the same time suggest other possible uses for petroleum waxes. Principal use of refined paraffin wax is in packaging food products, and such applications are by far the largest consumers of petroleum waxes. The accompanying table lists the different commercial petroleum waxes, largely in the micro category, by groups, depending on their physical properties and performance characteristics. These properties largely determine the applications to which a wax can be put.

Group A includes the lower melting point, softer (or higher penetration) grades of microcrystalline waxes. They are usually characterized by their plasticity, tackiness, and good flexibility, and will tend to impress their crystalline form on other petroleum waxes of the paraffin type. For this reason one of their principal uses is as a laminating agent for paper, paperboard, cellophane, foil, or other type web material.

They are also used extensively in the electrical industries, either alone or modified, as coating, impregnating and potting compounds. Other principal uses are as modifiers for paraffin wax; waterproofing and finishing compounds in the textile and leather industries; protective liners in kegs, cans and other containers; cosmetic wax formulations; polishes; and in rust-preventative dip coating compounds. Applications are also found in the printing industry as an ingredient in lithographing inks, and in electrotyping and carbon paper wax formulations. Microcrystalline waxes of this type, when added in small percentages to paraffin wax, will improve tensile strength and modulus of rupture. Larger amounts will improve flexibility and sealing strength, but will increase blocking tendencies.

Group B is characterized by the high melting point, hard (or low penetration) type of microcrystalline waxes. They are used extensively in the electrical industry as coating and impregnating compounds; in the formulation of paste polishes, leather dressings, waterproofing compounds, carbon paper and paper coatings, and sun checking waxes; and as paraffin wax modifiers. Oxidized products of these waxes are used extensively in emulsion type polishes as carnauba extenders. When added to paraffin wax these types will tend to improve blocking properties.

Group C waxes are somewhat intermediate between those listed in Groups A and B. They are considerably harder than Group A and their melting points in general are considerably lower than

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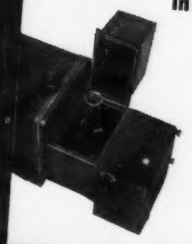
TEST TUBE HOLDER

Simplifies direct measurement of samples in round test tubes



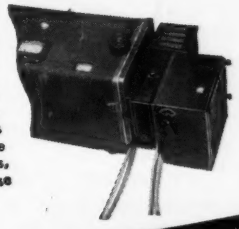
A metal carriage rigidly holds test tubes from 10 mm to 25 mm (1") in diameter in special lightproof housing. A single holder accommodates the various sizes of test tubes and allows exact relocation of tubes horizontally, vertically and rotationally. An accessory unit also permits use of 2" beakers interchangeably in the same carriage.

Designed for oil chemistry; Vitamin "A" analyses; clinical and medical applications, and many other routine uses.

THERMOSPACER

Enables temperature control of sample compartment

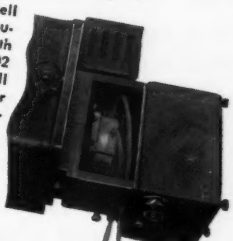
A corrosive-resistant, light-tight, metal plate contains internal coils for circulating constant temperature fluid. Thermospacers mount directly on standard instrument. Can be used singly or in combination to maintain sample compartment constant at any temperature between 0 and 100°C. The standard Model DU cell compartment can be held to less than one degree change for a ten degree change in ambient temperature.



Designed for greatest measurement accuracy with the Model DU . . . and for special measurements such as chemical analyses at constant temperature; the study of reaction rates at various temperatures; precise measurement of extinction values, and other applications where close temperature control is essential.

SHORT PATH FLOW CELL

For extremely short path length measurements on flowing or static samples



Consists of two flat, transparent plates which form an internal cell through which sample can be circulated without exposure to air. Path lengths from 0.05 to 2.5 mm (0.002 to 0.098 in.) available. A special cell compartment containing cell holder and precision positioning carriage attaches directly to Model DU.

Quartz optics permit full-range measurements, 220 to 1000 mmu . . . All critical surfaces optically polished to ¼ wavelength for precise measurements . . . Extreme flatness of plates allows fluid-tight seal without gaskets or sealing compounds.

Designed for flowing or static measurements on strongly absorbing samples without dilution; on blood samples in vivo under anaerobic conditions (such as determining oxygen capacities of whole blood); for microchemical studies of reaction rates, etc.

50 cm. LIQUID ABSORPTION CELL

For long path length measurements on weakly absorbing samples

To conserve sample volume, the cell is only 25 cm. long, the light beam passing twice through the sample before reaching the phototube.

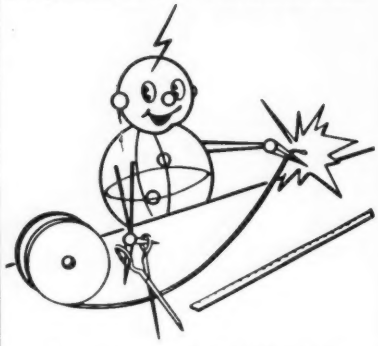
A special lightproof cell compartment provides a convenient means of standardization without the necessity of using a reference cell. All optical parts are of quartz to utilize full Model DU measurement range. Liquid seals made without gaskets to avoid sample contamination. Careful design eliminates scattered light effects.

Designed for dilute solutions and weakly absorbing samples where a long path length is required. Also for use with flowing samples and for utmost sensitivity in nephelometric measurements to determine, in addition to intensity, the distribution and average size of light-scattering particles.

ANNOUNCING

NEW RIBBON FORM OF LITHIUM METAL

PROTECTED BY PETROLATUM



A new, convenient *ribbon*-form of Lithium metal is now offered for the first time by Metalloy engineers. This ribbon is ¼ inch wide by 1/32 inch thick and wound on convenient spools. Instead of protecting it by oil immersion, it is coated with petrolatum.

Every chemist in the synthetic organic field will immediately recognize the advantages of this new form. It eliminates the necessity of weighing — the amount required is measured without removing the petrolatum and cut off. Then the petrolatum coating is easily removed by common hydrocarbon solvents. The Lithium metal remains shiny and clean right up to the time it is used.

Metalloy engineers developed this new ribbon-form at the request of volume users in the synthetic organic field. Formerly, these same engineers pioneered the manufacture of Lithium metal in the form of wire, shot, rod and cup.

If you are in doubt about the form most suitable for your operations, write today to department A for free data sheets.

METALLOY CORPORATION
RAND TOWER MINNEAPOLIS, MINN.
Division LITHIUM CORPORATION OF AMERICA, INC.

into suitable colloidal dispersion in waxes by milling and/or by special mixing machines. These mixtures are widely used commercially for waterproofing, laminating, coating, etc. Polyethylene can be brought into solution by suitable mixing methods but instead of forming a fine dispersion like rubber or ester gum, it separates at a definite temperature depending upon concentration and molecular weight. Polyethylene will improve tensile strength, toughness, gloss, sealing strength, and blocking resistance in petroleum wax formulations.

Waxes like carnauba, beeswax and candelilla go into solution readily, and petroleum waxes are commonly used as extenders for these materials in polishes and cosmetic products. Mixtures of petroleum waxes with other organic materials, however, often result in large viscosity increases which may complicate application methods depending upon low viscosity and high speeds.

Highly refined paraffin waxes are used in the manufacture of chlorinated waxes. Waxes of low oil content are required in these products to insure good stability. They are generally used as flame retardants and in high pressure lubrication.

EMULSIONS

Besides being applied directly in molten condition, petroleum waxes are used extensively in emulsion form. An important use of wax emulsions is in the sizing of paper and paperboard. Scale wax, refined wax, and micro waxes go into these applications.

In the internal sizing of paper, the wax often is mixed with rosin and the emulsifying agent may consist of rosin salts. The emulsion is applied to the beaters, before the pulp goes to the machines. In surface sizing, the wax emulsion is applied at the machine from a tub, or at the calenders. Sizing increases water and scuff resistance, besides having other advantages.

Petroleum waxes also are found in polish emulsion formulations. Other common uses for emulsions are showerproofing fabrics, application to nursery stock to prevent desiccation, and coating of fruits and vegetables to inhibit desiccation and improve appearance.

Permanent emulsions from straight petroleum waxes are more difficult to formulate than those from waxes like carnauba, ouricuri, candelilla and beeswax, and often require special study of conditions, formulation, and emulsifying agents. Recently, oxidized high melting point petroleum waxes have been introduced for use both as a wax and an emulsifying agent in conjunction with suitable alkalis, but they are most effective when formulated with other waxes.

PRINCIPAL USES

The following is not intended to be a detailed discussion but more to indicate in a general way the principal uses and at the same time suggest other possible uses for petroleum waxes. Principal use of refined paraffin wax is in packaging food products, and such applications are by far the largest consumers of petroleum waxes. The accompanying table lists the different commercial petroleum waxes, largely in the micro category, by groups, depending on their physical properties and performance characteristics. These properties largely determine the applications to which a wax can be put.

Group A includes the lower melting point, softer (or higher penetration) grades of microcrystalline waxes. They are usually characterized by their plasticity, tackiness, and good flexibility, and will tend to impress their crystalline form on other petroleum waxes of the paraffin type. For this reason one of their principal uses is as a laminating agent for paper, paperboard, cellophane, foil, or other type web material.

They are also used extensively in the electrical industries, either alone or modified, as coating, impregnating and potting compounds. Other principal uses are as modifiers for paraffin wax; waterproofing and finishing compounds in the textile and leather industries; protective liners in kegs, cans and other containers; cosmetic wax formulations; polishes; and in rust-preventative dip coating compounds. Applications are also found in the printing industry as an ingredient in lithographing inks, and in electrotyping and carbon paper wax formulations. Microcrystalline waxes of this type, when added in small percentages to paraffin wax, will improve tensile strength and modulus of rupture. Larger amounts will improve flexibility and sealing strength, but will increase blocking tendencies.

Group B is characterized by the high melting point, hard (or low penetration) type of microcrystalline waxes. They are used extensively in the electrical industry as coating and impregnating compounds; in the formulation of paste polishes, leather dressings, waterproofing compounds, carbon paper and paper coatings, and sun checking waxes; and as paraffin wax modifiers. Oxidized products of these waxes are used extensively in emulsion type polishes as carnauba extenders. When added to paraffin wax these types will tend to improve blocking properties.

Group C waxes are somewhat intermediate between those listed in Groups A and B. They are considerably harder than Group A and their melting points in general are considerably lower than

BECKMAN "DU" SPECTROPHOTOMETER

Long the standard research spectrophotometer for ultraviolet, visible and near-infrared measurements, the Beckman "DU" assumes even greater usefulness through the development of new accessory equipment.

Most recent additions to the diversified line of accessories are the four described at right. Detailed information on these and other accessories will be gladly sent on request. *Beckman Instruments, National Technical Laboratories, South Pasadena* 17 *Calif.*

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Radiation Meters—Special Analytical Instruments
pH Meters and Electrodes—Spectrophotometers

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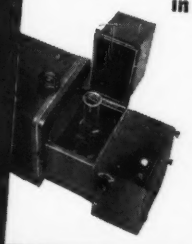

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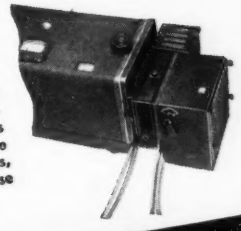

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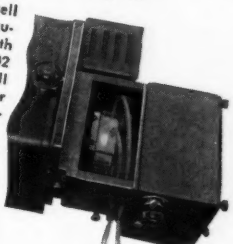

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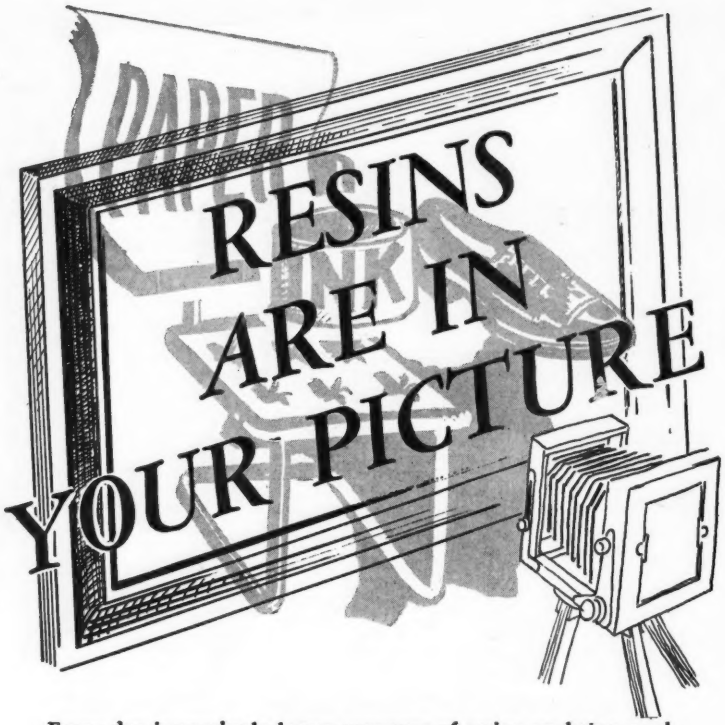

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But, before resins can be used as coatings, adhesives, binders, sizes and saturants, they must be converted to a usable form. That's where ARCC comes into your picture. For ARCC produces *correctly converted, ready-to-use* emulsions, dispersions, solvent solutions and hot melts right for your equipment and process.

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Plastic — Inks, clear and colored coatings, adhesives.

Textile — Artificial leather coatings, plush backsize, impregnants.

Shoe & Leather — Emulsion tackifiers for natural and synthetic rubber latices.

Let ARCC's long and varied experience help put resins in your picture. Write today for recommendations.

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Group B. They lack good adhesive properties and therefore are not good laminating materials. Since they produce hard, tough films, they are used extensively, either alone or modified, for coating and impregnating paper, paperboard, and other weblike materials. Because of their good electrical properties, they find wide use as coating, impregnating, and potting compounds in the electrical industry. They are also used in paste polishes, paraffin wax modifiers, cosmetics, sizings, leather dressings, certain emulsion formulations and as a major component in sun checking waxes to prevent the cracking of rubber when exposed to sunlight.

Group D, like Group C, is intermediate but at the same time more of a crystalline nature like the paraffin waxes. They are used for somewhat the same applications although they do not exhibit the toughness or hardness of some of the waxes in Group C. They are somewhat flaky and are softer than most good grades of refined paraffin wax and are usually employed in coating formulations where a higher melting point is desirable.

ECONOMIC ADVANTAGES

Petroleum waxes are attractive raw materials to specialties manufacturers for the following reasons: (1) adequate supply at all times, (2) low cost and minor fluctuations in price, (3) desirable properties for certain uses, (4) ease of application, and (5) variations in such properties as melting point, hardness, adhesiveness, etc.

The outstanding property of petroleum waxes is resistance to passage of water vapor. This property has made possible the development of modern protective packaging other than metal containers which, incidentally, are coated with wax themselves. The low viscosity of petroleum waxes makes them easy to apply to fibrous materials, and their ready miscibility and compatibility give them broad scope and wide commercial value. Whether shipped in slabs or tank cars, wax is conveniently handled.

Production, according to the Bureau of Mines, reached a half million tons in 1947. The proportion of microcrystalline wax produced at the present time is considerably less than other types. In April, 1949, for example, 63.1% of the total production was fully refined wax; 5.3%, micro waxes; and 31.6%, other waxes. The present f.o.b. price range for paraffin waxes is from 6.35 to 10.55 cents per pound, while that for microcrystalline varieties is between 7.25 and 33.50 cents per pound. Whenever increased production, or new products are needed, the refining industry can be depended to supply these at reasonable prices.

A page from the Stauffer Catalog

NUMBER THIRTEEN IN A SERIES

ROCHELLE SALT

Other Names ..... Seignette Salt, Potassium-Sodium Tartrate, Sodium Potassium Tartrate.

Formula ..... $KNaC_4H_4O_6 \cdot 4H_2O$ or $C_2H_2(OH_2)\ COONa \cdot COOK \cdot 4H_2O$.

Properties ..... Odorless, colorless, transparent, rhombic prisms. It has a cooling saline taste, and the crystals effloresce slightly in dry air. Sp. Gr. 1.79. Melting Point 70°-80° C. or 158°-176° F. Loses water of crystallization ($4H_2O$) at 140° C. or 284° F. Very soluble in water.

Grades ..... U.S.P. Snowhite Powder; Snowhite Granular.

Analysis (Typical) .... Potassium Sodium Tartrate (after dehydration) Minimum ..99.0%
Heavy metals .....3 to 5 parts per million, as lead
Ammonia .....Negative

Alkaline to Litmus, but neutral to phenolphthalein.

Meets all requirements of the United States Pharmacopoeia XII official from November 1, 1942.

Principal Uses ..... Manufacture of Seidlitz powders, and pharmaceutical preparations. In medicine as a mild saline purgative. It is used as an electroplating reagent, silvering mirrors, in tanning, in Schnitzler's Green and as a laboratory reagent.

Packing ..... Drums, 250 lbs. net (approx. 264 lbs. gross)
Kegs, 100 lbs. net (approx. 112 lbs. gross)

Shipping Regulations None.

Stocks ..... San Francisco, Calif., and New York, N. Y.

STAUFFER PRODUCTS

BHC (Benzene Hexachloride)
Borax
Boric Acid
Carbon Bisulphide
Carbon Tetrachloride
Caustic Soda
Chlordane
Chlorine
Citric Acid
DDT (Dichloro Diphenyl Trichloroethane)
Silicon Tetrachloride
Sodium Hydrosulphide
Sulphur (Specially processed for all industrial uses)
Sulphur Chloride
Sulphuric Acid
Tartaric Acid
Textile Stripper
Tifanium Tetrachloride
Toxaphene (Chlorinated Camphene)
2, 4-D (Acid, Isopropyl Ester, Amine Salts)

Stauffer CHEMICAL SINCE 1885

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SPECIALTIES NEWS

A.M.A. to Study Pesticide Effectiveness, Safety

Studies to determine the effectiveness and safety of pesticides are planned by the American Medical Association Joint Committee on Pesticides. This decision is the outgrowth of a recent meeting in the A.M.A. headquarters in Chicago. The meeting was attended by representatives of the A.M.A. Council on Pharmacy and Chemistry and Council on Foods and Nutrition, the Federal Food and Drug Administration, state departments of public health, private and industrial toxicological laboratories and research institutes and trade associations.

Immediate objectives of the committee are the following:

1. Establish safe standards for use.
2. Foster development of prophylactic and antidotal measures.
3. Stimulate voluntary control.
4. Assist in standardization of nomenclature.
5. Accumulate and evaluate new information.
6. Implement an intensive educational program.

The committee hopes to encourage voluntary control by bringing health problems to industry's attention and suggesting possible ways for their correction.

New Tannin Source

The cascalote tree, which grows abundantly in Mexico, may provide a new tannin extract source for the U. S., according to Francis Godwin, director, Armour Research Foundation, International Division. Armour, under the sponsorship of the Banco de Mexico, has been studying the tanning agent with the aim of overcoming its perishability in its old form. Heretofore cascalote has had only localized use.

Armour's work has resulted in a process whereby extraction and drying could be done at small plants located so as to serve each area in which the tree grows. The extract is concentrated and dried to produce a solid.

Such procedure would reduce transportation costs, by eliminating water; allow the tanner to measure out desired amounts for immediate use; provide more uniformity in his tanning work; produce the better tanning agents derived from using fresh pods immediately after harvesting.

Armour, in its small pilot plant tests, has successfully used vacuum drum drying and spray drying on the extracts. It believes use of its process would result in tannin being available on the U. S. market at an appreciably lower price than the Argentine quebracho. However, cascalote supplies must be increased by planting or by access to trees in more remote areas.

Walter J. Armstrong, manager, Mexican Operations for ARF, has stated that definite plans for commercialization are being worked out, with several companies interested in entering the field. Another likely use of the solid extract is in the stabilization of muds in oil-drilling.

Robert S. Casey, chief chemist of the W. E. Sheaffer Pen Co., Fort Madison, Iowa, who has been awarded the 1949 Iowa Medal of the American Chemical Society's Iowa Section for his outstanding contributions to the development, production, and testing of ink.

N. Y. Branch for Johnson

S. C. Johnson & Son, Inc., wax manufacturer, has built a half-million dollar branch office and warehouse at Long Island City, N. Y., to take care of the company's expanding wax polish business in its New York district and to handle some export shipments to Europe. It is a modern 35,000 sq. ft. building.

Michigan Chemical Sells Interest in Pine Bluff

The Michigan Chemical Corp. has sold its interest in Pine Bluff Chemical Co. located at Pine Bluff, Ark., to the Niagara Chemical Division of Food Machinery and Chemical Corp., which was joint owner and operator of Pine Bluff Chemical with Michigan Chemical.

Pine Bluff was established in 1947 under the name Michemco to manufacture DDT at facilities leased from

Would you store your dollars in a sieve?

Some quaternary ammonium compounds lose germicidal potency in a matter of days or weeks. No matter how low-priced such materials *appear* to be, formulating with them is like storing your dollars in a sieve . . . the qualities you pay for leak away with the passage of time.

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QUATERNARY AMMONIUM COMPOUND

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Repeated tests show that ONYX BTC is one quaternary you can depend upon for maximum germicidal potency, no matter how long you store it. This stability is a sound reason why so many processors specify ONYX BTC . . . why they call it the most economical and useful quaternary on the market today. No other quaternary gives you more value, higher bactericidal effectiveness . . . greater versatility in application. A new technical bulletin explains in detail the many advantages afforded by ONYX BTC. Your copy is free for the asking.

*Registered trademark for Onyx alkyl dimethyl benzyl ammonium chlorides.

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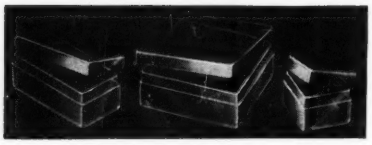
Industrial Division Jersey City 2, N. J.

CHICAGO BOSTON CHARLOTTE ATLANTA

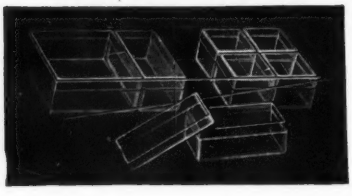
ALL-SEE Transparent Boxes



For exhibiting samples or specimens of solids. Ideal for showing, in compact form, the fineness, crystalline structure and color of your products.

Can be carried in salesman's sample case.

Can be stacked in the laboratory with contents completely visible. Can be used to keep small parts in order —and visible. Fine for protecting fragile specimens. You will find many uses for these transparent boxes.



Separate boxes can be assembled in transparent cases for convenience in handling groups of samples.

Five Sizes: (Outside Dimensions)

A: 15/16" x 15/16" x 3/4"
B: 1-7/8" x 15/16" x 3/4"
C: 1-7/8" x 1-7/8" x 3/4"
D: 3-1/4" x 2-3/4" x 1-1/4"
E: 6" x 7/8" x 3/4"

Prices: **A: 20** for $1 ; **100** for $4.60
B: 15 for $1 ; **100** for $5.60
C: 12 for $1 ; **100** for $6.60
D: 5 for $1 ; **100** for $17.50
E: 6 for $1 ; **100** for $16.00

We pay postage if remittance accompanies order

Descriptive leaflet giving full details will be furnished on request.

Just ask for Leaflet TR-CI.

R. P. CARGILLE

Products for Scientific Laboratories

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the government arsenal at Pine Bluff. Chlorine was supplied by pipe line from the Diamond Alkali Co., which had leased the chlorine plant at the arsenal. The first DDT was produced in June, 1947, and the plant has operated on a seasonal basis for the last 2½ years.

Common Names Given Five Fungicides

The Subcommittee on Fungicide Nomenclature of the American Phytopathological Society, cooperating with the Interdepartmental Committee on Pest Control, has selected common names for five commercially-available fungicidal chemicals which are useful in the control of various destructive plant diseases. Information concerning the names, the approval and acceptability of their use as coined common names for these specific chemicals is filed with the Trade-Mark Division of the United States Patent Office, to preempt the use of the names as trade marks.

The coined common names and designations are:

Ferbam for the fungicidal chemical, ferric dimethyl dithiocarbamate.

Ziram for the fungicidal chemical, zinc dimethyl dithiocarbamate.

Nabam for the fungicidal chemical, disodium ethylene bisdithiocarbamate.

Zineb for the fungicidal chemical, zinc ethylene bisdithiocarbamate.

Thiram for the fungicidal chemical, tetramethylthiuram disulfide.

Government Contract Awards

Among recent contracts awarded by the Government were the following: by the Department of the Navy to Becker Chemicals, Inc., Ambler, Pa., $136,832 for 92,180 gal. of corrosion-preventive compound; by the Department of the Army to Cowles Chemical Co., Cleveland, $123,478 for 1,387,000 lb. of dishwashing compound.

Methoxychlor to Be Packed In Canister

Methoxychlor, the insecticide of low toxicity developed by the Du Pont Co., will be available in 1950 in a convenient eight-ounce container for garden and household use. Up to now the smallest quantity packed has been a four-pound bag.

The new canister, to be marketed by the Retail Products Division of the Grasselli Chemicals Department, was designed to meet the requirements of small users. The methoxychlor in it will be of 50% strength, in the form of a wettable powder, which can be readily mixed with water. Methoxychlor technical does not mix readily with water.

Companies

The Industrial Chemicals Division of American Cyanamid Co. has installed new production facilities for carburizing and heat-treating compounds at its Kalamazoo, Mich., plant. Cyanamid will continue to manufacture some of these compounds at its Warners Plant in Linden, N. J.

The Dow Chemical Co. has made a $500,000 out-of-court settlement of a lawsuit brought against it last year by the Pyrene Manufacturing Co. seeking damages in the amount of $5,030,000. Settlement involved dismissal of the suit by Pyrene and a $250,000 cash payment by Dow, plus a $250,000 merchandise credit to be used by Pyrene over the next five years in the purchase of Dow products.

A new firm, Speedi-Dri Corp., has been formed to market the oil and grease absorbents known as Speedi-Dri and Sol-Speedi-Dri in the New England states, New York, Eastern Pennsylvania and part of New Jersey. The firm has established its main headquarters at 210 West Washington Square, Philadelphia. All sales will be handled by the New York City office at No. 1 Wall St.

Melville Sahyun, formerly vice-president and director of research of the Frederick Stearns and Co., Division of Sterling Drug, Inc., has opened Sahyun Laboratories in Santa Barbara, Cal. The laboratories are engaged in research in medicinal chemistry, nutrition, biochemistry and pharmaceutical products in general.

The Emulsol Corp., Chicago, has selected Theodore Riedeburg and Associates, New York, to act as technical sales representative in the agricultural, industrial and sanitation chemical fields in New York and upper New Jersey to promote its surface active chemical agents.

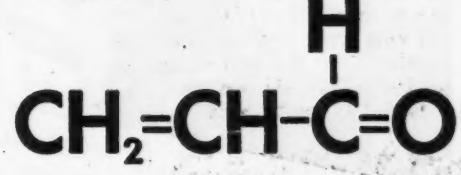
Norwich Pharmacal Co. has awarded contracts for the construction of a chemical manufacturing building at Woods Corners, near Norwich, N. Y., to the Syracuse firm of Conlon & Farnsworth.

Morningstar, Nicol, Inc., New York, has been appointed sales agent for the Houlton and Mars Hill, Me., factories of the New England Starch Co. This combines the sales of the New England Starch Co. plants with the Aroostook Potato Products Co., a subsidiary of Morningstar, Nicol, Inc. The output

From SHELL CHEMICAL

New Lower Price!

ACROLEIN



THE VERSATILE, EXTREMELY REACTIVE INTERMEDIATE

Because of its almost unlimited reaction possibilities, Acrolein is being used or is under consideration for a wide variety of products.

At the new, substantially reduced price, Acrolein is now an even more attractive intermediate . . . allowing economical exploration of its use for important new products.

Some of the products of the many possible Acrolein reactions are listed here. If you are working with any of these, we suggest that you investigate the advantages *and new economies* of Acrolein. We will be glad to discuss the use of Acrolein in your processes.

PROPERTIES

Molecular Weight	56.06
Specific Gravity 20/4°C.	0.8389
Melting Point	—86.9°C.
Boiling Point	52.7°C.
Flash Point, Tag Open Cup	Below 0°F.

Colorless . Soluble in alcohol and ether

REACTIONS OF THE CARBONYL GROUP

Reactant	Conditions of Reaction	Products of Reaction
KCN	Glacial acetic acid in ether solution	$CH_2{=}CH{-}\underset{OH}{CH}{-}CN$ acrolein cyanohydrin
Malonic acid	Pyridine solution	$CH_2{=}CH{-}CH{=}CH{-}COOH$ 2,4-pentadienoic acid
Acetic anhydride	In presence of acid	$CH_2{=}CH{-}\underset{O{-}C{-}CH_3}{\underset{\|}{\underset{\|}{CH}}}{-}O{-}C{-}CH_3$ acrolein diacetate
C_2H_5MgBr	Grignard solution	$CH_2{=}CH{-}\underset{OH}{CH}{-}C_2H_5$ 1-penten-3-ol
HCl (dry)	Low temperature	$Cl{-}CH_2{-}CH_2{-}CHO$ β-chloropropionaldehyde

REACTIONS OF THE DOUBLE BOND

Furan	Presence of SO_2 and high temperature	2-furanpropionaldehyde and 2,5-furandipropionaldehyde
Cyclopentadiene	Elevated temperatures	2,5-endomethylene-1,2,5,6-tetrahydrobenzaldehyde
RSH	—	$R{-}S{-}CH_2{-}CH_2{-}CHO$ β-alkylthiopropionaldehyde
Phenol	In presence of acid or dilute alkali	aldehyde type resins

SHELL CHEMICAL CORPORATION

EASTERN DIVISION
500 Fifth Avenue, New York 18

WESTERN DIVISION
100 Bush Street, San Francisco 6

LOS ANGELES
HOUSTON
ST. LOUIS
CHICAGO
CLEVELAND
BOSTON
DETROIT
NEWARK

In advertisements like this, reproduced from The Saturday Evening Post, Barrett builds public interest in the products you make—products that contain Barrett Coal-tar Chemicals—products that contribute to raise the standard of American living.

At the other end of the television tube...

At the back end of your television tube—the end you never see—there's a little cap with an interesting job to do.

This is where all the "strings" are finally tied together and electronics starts to become entertainment. In go the electrons and out comes the picture!

This hardworking little cap is made of plastic. So are hundreds of other essential gadgets that help make television work. From the studio to your set, television travels a road that is paved with plastics.

Barrett supplies *phenol* from which many of these plastics are made. It also supplies plasticizers to make them tough. These are only a few of the many Barrett basic products which add to the fun, comfort and convenience of life in modern America.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

Barrett

Reg. U. S. Pat. Off.

ONE OF AMERICA'S GREAT BASIC BUSINESSES
Wood Preservatives . . . Building Materials . . . Paving Materials
Coal-tar Chemicals . . . Protective Coatings . . . Nitrogen Products

BARRETT* COAL-TAR CHEMICALS

- Phenols
- Cresols
- Cresylic Acids
- Chlorinated Tar Acids
- Xylenols
- Pickling Inhibitors
- Benzol
- Toluol
- Xylol
- Naphthalene
- Hi-Flash Solvent
- Phthalic Anhydride
- Dibutyl Phthalate
- "ELASTEX" DCHP Plasticizer
- "ELASTEX" 10-P Plasticizer
- "ELASTEX" 50-B Plasticizer
- "ELASTEX" 28-P Plasticizer
- Niacin (Nicotinic Acid)
- Pyridines
- Picolines
- Tar Acid Oils
- Neutral Coal-tar Oils
- Coal-tar Creosote
- CUMAR* Paracoumarone-Indene Resin
- Carbonex* Rubber Compounding Hydrocarbon
- Bardol* Rubber Compounding Oil
- Flotation Agents

*Reg. U.S. Pat. Off.

of the three mills represents the largest tonnage of potato starch produced in Aroostook County.

Leo R. Gardner (left), appointed vice-president of the California Spray-Chemical Corp., Richmond, Cal., and Henry W. Gadsden, elected vice-president of Sharp & Dohme, Inc., of Philadelphia. Mr. Gardner has been manager of the research and development department of his company. Mr. Gadsden is Sharp & Dohme's director of pharmaceutical production and engineering.

The Pennsylvania Salt Manufacturing Co.'s B-K and Household Products departments have been combined to provide more efficient sales and service to customers in both fields. In the new department, called the B-K and Household Products department, B-K salesmen are devoting full time to the dairy trade, while Household Products salesmen are concentrating on serving jobbers and other wholesale and retail outlets.

Illinois Adhesive Products Co., Chicago, has purchased property from the Allison-Bedford Co. and will move to the larger quarters immediately.

A new branch office and warehouse building was formally opened by Abbott Laboratories recently in Cincinnati, O. It is a one-story structure in modern factory style, offering 22,000 square feet.

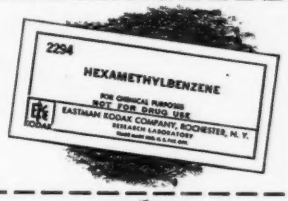
F. G. Okie, Inc., has moved into its new plant in Philadelphia where improved facilities for manufacture of printing inks and lithographic offset specialties have been installed.

Consolidated Chemical Industries, Inc., has installed modern continuous glue drying equipment in its Bayshore, Cal., plant. The new machinery includes a highly self-contained and automatically-controlled unit which is said to eliminate any variation in quality.

A new laboratory complete with modern equipment for research and testing in the metal finishing field has recently been added by The Chemical Corp., 54 Waltham Avenue, Springfield, Mass.

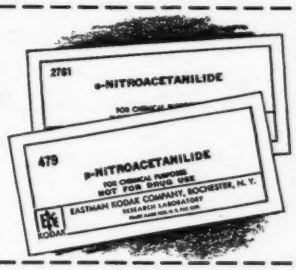
Sometimes you need a Beakerful, not a Carload

Wondering what decomposition products you'd get from a gram of completely methylated benzene?



Speculating on the possible advantages of using a really pure solvent?

Considering the effect of a change in position of substituents in your process intermediate?



Trying to work out a reaction that starts from two bromines and a hydroxyl on three adjacent carbons?

Eastman maintains the world's most complete stock of organic compounds. Next time you need chemicals in laboratory quantities it will save you time and money to remember that.

EASTMAN KODAK COMPANY
Organic Chemical Sales Division
KODAK ROCHESTER 4, N. Y.

THERE ARE SOME 3000 EASTMAN ORGANIC CHEMICALS

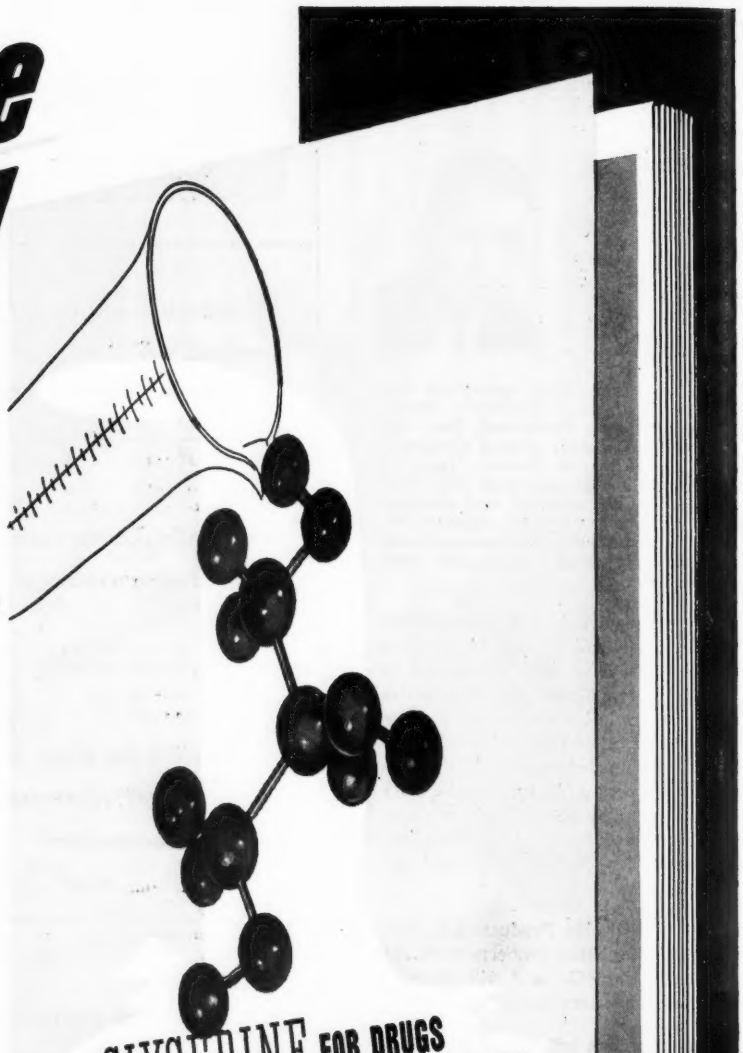
First Time Offered!

a practical review of GLYCERINE applications in Drugs and Cosmetics—

WHERE? . . . How? . . . Why? . . . If you're looking for the answers to these questions on glycerine usage in the drug and cosmetic industries—here's the most up-to-date information available!

"Why Glycerine for Drugs and Cosmetics?" has been reviewed by prominent medical authorities, technical consultants, and the Research Laboratories of the Glycerine Producers' Association. Contains detailed information by charts and tables of the physical and chemical properties of glycerine—the origin and development of this amazingly useful alcohol—grades and their applications. 16 pages of practical, useful data!

Whether you now use glycerine or just wonder about its possibilities . . . whether you're in management, production, or research . . . an expert on glycerine, or thoroughly unfamiliar with the subject—you'll want this informative booklet. Write for your free copy—today! *Address: Dept. CI, Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y.*



GLYCERINE PRODUCERS' ASSOCIATION
295 Madison Avenue, New York 17, N. Y.

NEW CHEMICAL SPECIALTIES

Note: This section limited to new finished specialties. New raw materials and intermediates of interest to specialties manufacturers are described in New Products and Processes department.

Liquid Detergent

Low-temperature solubility; good foaming, detersive, wetting properties mark new alkyl aryl sulfonate.

The Atlantic Refining Co., Philadelphia, has developed a new liquid detergent called Ultrawet 60L. This new amber-colored liquid is an organic alkyl aryl sulfonate which is 60% active and 40% water. Ultrawet 60L remains crystal clear at temperatures below 20° F. This feature, coupled with high foaming characteristics, excellent detergency and strong wetting properties, is expected to result in demand for the material as a dishwashing detergent both in the household and in restaurants, hotels, taverns, etc.

Other possible applications where the unique low-temperature solubility characteristics, in addition to the other properties, may be of value include cosmetic formulations such as shampoos, various textile processes, emulsion polymerizations and insecticidal formulations.

Ultrawet 60L is available in tank cars, tank trucks, and specially-lined 55-gallon drums.

Wood Preservative

Effective wood preservative contains non-toxic solubilized copper fungicide.

Non-Tox, a new non-toxic wood preservative developed by Brooklyn Varnish Mfg. Co., Inc., 50 Jay St., Brooklyn, N. Y., is said to show unusual fungicidal effectiveness. Based on synthetic resins, it contains a newly developed non-toxic solubilized copper fungicide.

Tuf-On "Non-Tox" Wood Preservative is effective against mold, decay, mildew and moisture and is now being used for truck bodies, boats, prefabricated house panels, etc. Methods of application vary with the product although dip treatment is most economical. It is also available in special solutions for fungus proofing canvas, rope, leather and fibre.

Dry Cleaning Concentrates

Detergent concentrates for dry cleaning increase efficiency, are inexpensive and simple to use.

The Alrose Chemical Co., Providence, R. I. (P. O. Box 1294) has developed two new synthetic detergent concentrates for dry cleaning: Alrolene 65 for synthetic solvents and Alrolene 70 for petroleum solvent.

The Alrolenes are said to step up cleaning action of dry cleaning solvents 35-50%. They loosen or remove many types of stains in the wheel; they are also recommended for slop spotting.

They are economical to use (one gallon will clean 4000-6000 lbs. of clothes) and the insignificant cost per garment is more than compensated by reduced spotting, wet cleaning and rerun expenses. These concentrates are simple to use—as prespotters, dry soaps, filter soaps, moisturized soaps or two-step soaps; they are powerful water emulsifiers.

They contain no moisture, no dry cleaning solvent, no fatty acid to develop odor; are non-corrosive; don't clog filters nor foam in the still. The Alrolenes are stable in storage and have flash points above 220° F.

Corrosion-Resistant Coating

Resin coating of high resistance to corrosive materials available for experimental purposes.

A new type of coating has been developed at Brooklyn Polytechnic Institute in conjunction with the Carboline Co., 7603 Forsythe Blvd., St. Louis, Mo. Made for application at room temperature, it requires no mixing and is flexible when dry. Chief advantages it is claimed to have over polyvinyl chloride and chlorinated rubber coatings are resistance to acids of higher concentration, to higher liquid temperatures (180-200°), and to alcohols and to chlorinated straight-chain and aromatic hydrocarbons.

Known as B Resin Solution, it is available in limited amounts from Carboline for experimental purposes to those who will give information on its application. When in full production, it is expected to sell for about $6.00 a gallon.

Weedkiller

Aromatic petroleum product for control for annual and perennial grasses and broad-leafed weeds.

A highly aromatic petroleum product, Shell Weedkiller 20, has been developed by Shell Chemical Corp., 500 Fifth Ave., New York, especially for weed control. Possessing both acute and chronic toxicity to annual and perennial grasses and broad-leaved weeds, it does not leave a residue injurious to livestock. It does not sterilize the soil although germination of weed seeds is often prevented for several weeks.

It is applied undiluted and without agitation; hence, almost any type of pressure sprayer can be used with it. The new weedkiller is ideally suited for weed control around industrial property; along highways, railroads, rights-of-way; along irrigation ditches, etc.; in vineyards, citrus groves and orchards; and in certain crops for specific weed control problems.

Heat-Sealing Adhesive

Low sealing pressure, short contact time feature new adhesive.

A heat-sealing adhesive of a new type has been developed by Polymer Indus-

NIACET

TRADE-MARK

ACETATES

ALUMINUM ACETATE
20% Normal and 24% Basic Solutions for technical use.

ALUMINUM FORMATE
21% Basic Solution for technical use.

"NIAPROOF" POWDER
Water-soluble, stable, basic aluminum acetate. Water repellent.

COPPER ACETATE
A non-dusting, normal cupric salt, soluble in water.

POTASSIUM ACETATE
Anhydrous, Technical, or U.S.P. grades. Also available in solution in tank cars.

SODIUM ACETATE
Anhydrous and N.F.VIII 60%. Also Technical 60% for rubber compounding exclusively. All grades low in iron and chlorides.

SODIUM DIACETATE
A convenient powdered source of acetic acid—Technical or Anhydrous grades available.

ZINC ACETATE
A completely soluble, free-flowing, normal salt.

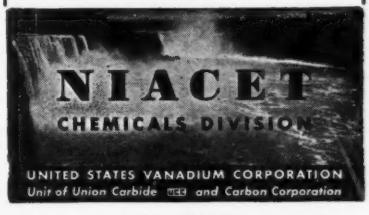
Also

VINYL ACETATE

SUCROSE OCTA ACETATE

NIACET acetates are made from synthetic acetic acid by carefully controlled processes assuring high quality and uniformity.

For Further Information Write to



Sales Offices:

922 Niagara Bldg. • Niagara Falls, N. Y.

FORMALDEHYDE

produced in the Chicago area for the Great Lakes Region and the Middlewest

MADE FROM OUR OWN RAW MATERIAL

Available in TANK CARS and DRUMS

let us tell you more

SPENCER

SPENCER CHEMICAL COMPANY

Executive & Sales Offices: Dwight Bldg., Kansas City 6, Mo.

tries, Inc., 11-08 30th Avenue, Astoria, N. Y. Unusual features are the low pressure as well as short time of contact necessary for sealing. Pressures as low as 1/16th pound per square inch suffice to give a strong bond and sealing times as low as 1/5th second can be employed.

The product, known as J30-2, can be coated on or sealed to kraft paper, pulp paper, plain or waxed glassine, waxed paper, cellophanes, diaphanes and other sheetings. It can be applied to these types of films without the use of heat. The dry film is odorless and tasteless and can be used on food packages.

Odorants for Plastics

New aromatic series controls unpleasant odors in plastics.

Descriptions of five new aromatic materials, entitled Res-O-Dors, designed to eliminate or mask the disagreable odors in finished plastic products, are found in Technical Bulletin 49-3, just published by Sindar Corp., New York. Concentrations needed to give a finished product of pleasant odor are said to range from 1/40 to 1/10 of 1%, based upon the total weight of the mix.

Acid Fixer with Hardener

Improved keeping qualities claimed for photographic product.

A new Acid Fixer with Hardener marketed by Ansco, Binghamton, N. Y., is said to be an improvement over the old acid hypo at no increase in cost. Greatly improved keeping qualities are claimed for the new product which combines fixer and hardener in a single powder for faster, easier mixing.

Ansco sells the Acid Fixer with Hardener in hermetically sealed cans with easy-opening keys. Since the fixer is anhydrous hypo, the new product will not cake or harden in the cans when exposed to summer heat.

First shipments are in gallon-size containers with half-gallon and quart sizes following as soon as they can be made available.

Bait Bait

"Chemical worm digger" attracts worms for fishermen.

No-Wilt Plant Products Co., North Olmstead, Ohio, is now distributing its "Early Bird" Chemical Worm Digger, a chemical mixture which, when sprinkled on moistened earth known to be inhabited with nightcrawlers, brings the worms up to the surface, to be plucked by the fisherman. National distribution in the spring is expected for the product, currently selling in many localities in 3 oz. shaker-top cans for 59¢, also in larger containers ranging up to $1.84 in price.

In addition to ease of capture, another advantage attributed to Early Bird is the unpinched, uninjured state of the worms, hence their longer life in captivity. Shaker can is handy in emergency—should bait stray or be depleted, the fisherman can replenish his supply on the spot.

Test-marketed in the north midwest, Early Bird is to be found in sporting stores, garden supply, hardware, general stores and the like. Early Bird (trade-name application pending) is manufactured by No-Wilt, which also produces Plantcote, a preservative for plant and shrub cuttings.

Di-Phase Cleaner

New product pre-cleans metals without attack, is simple to use.

Chemclean Products Corp., 64 Sixth Avenue, New York, N. Y., has developed Chemclean #133, a new di-phase cleaner, which pre-cleans all metals without attack. This material removes buffing and drawing compounds, oils, greases, etc.; it is safe to work with, simple and inexpensive to use; it eliminates all hand operations.

To makeup the bath, 1 volume of Chemclean #133 is poured on 3 volumes water (the #133 floats on top) and the tank is ready to work.

The di-phase cleaner can be used in conjunction with a vapor degreaser advantageously, but in many cases, users have eliminated vapor degreasing entirely.

Cost of this material is $1.50 per gallon in 5-gallon can, and substantially lower in 55-gallon drums.

Polystyrene Cleaner

Liquid cleaner for polystyrene is effective, yet non-crazing.

A new liquid cleaner for removing unwanted lacquer, grease stains, mold lubricants and foreign matter from polystyrene surfaces is being introduced to the plastics industry by Schwartz Chemical Co., Inc., 326 West 70th Street, New York, N. Y. Called Poly-Kleen, the new non-toxic cleaning compound is said to be more effective than time-consuming soap and water cleaning methods, and more efficient than ordinary solvents which have a tendency to craze the surface of polystyrene. It is available in one and five gallon cans.

Rubber Cement

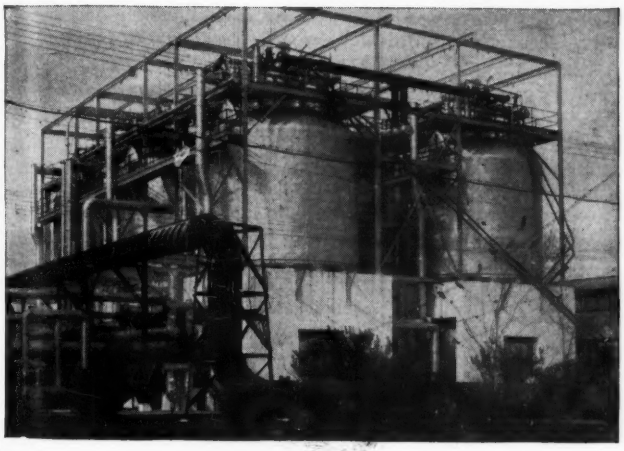
Synthetic rubber-resin adhesive has many applications.

A new, multiple purpose adhesive of the synthetic rubber-resin type which provides a light colored translucent film has been developed by Flintkote Co., Industrial Products Division, 30 Rockefeller Plaza, New York, N. Y. Designated as Flintkote No. 974 Rubber Cement, this product is said to be especially adapted for use with impervious surface materials

SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

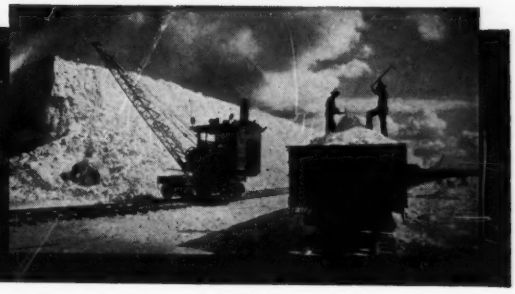
*SUPERHEATED WATER . . .



Mining operations are most successfully carried out if the water pumped into the sulphur deposit is heated under pressure to a temperature of about 320° F. For large scale mining, enormous quantities of water are required, so, a primary requisite is an adequate supply of suitable water and an efficient power plant in which to heat it.

To insure a continuous supply of water at Newgulf, it is the practice to use river water pumped in time of flood or full flow and stored in large reservoirs. This supply is supplemented, when necessary, with well water. Water so obtained is seldom suitable for use in boilers or mine water heaters without being treated first because of natural salts in solution. Softening by chemical treatment is necessary to prevent deposition of scale on boiler tubes and hot water lines.

Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.



TEXAS GULF SULPHUR CO. INC.

75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

and to applications requiring high bonding strengths.

The cement is supplied in a viscosity of 1,200-1,600 cps at 77°F and is recommended for bonding all of the following, in any combination: wood, canvas, aluminum, glass, phenolics, rubber, steel and saturated felt.

Fireproofing Coating

New cement coating prevents steel from sagging in case of fire.

Tests of a new fireproofing cement of the Eagle-Picher Co., Cincinnati, Ohio, have been completed by the Underwriters' Laboratories, Inc. The material, which is coated on beams and other steel industrial equipment to keep them from collapsing in case of fire, was rated by the laboratories and listed by them for re-examination. When applied in a 1¾" layer, the cement will retard the effect of great heat for three hours.

Advantages of the protective cement over other materials used for this type of fireproofing are said to be its lower weight and lower cost It can be troweled on without forms.

It is expected to find great application in chemical plants, oil refineries and other industrial installations where exposed steel is part of the structure. Brochures on the fireproofing can be obtained from Eagle-Picher.

Abrasive Binder

Quick cure of phenolic binder advantageous in sandpaper production.

A new phenolic quick-curing abrasive binder is being recommended by the Plaskon Division of Libbey-Owens-Ford Glass Co., Toledo, Ohio, particularly for sandpapers since it is claimed to yield bond strength equivalent to presently used phenolic resins while providing much more rapid setting with consequent production savings.

The quick-setting feature of the new Plaskon binder allows sandpaper manufacturers to eliminate much of the festooning previously required to cure the bond. Production time is thereby cut substantially and both space and equipment more efficiently used.

Thread Sealing Compound

Compound for pipe threads available in convenient stick form.

A new sealing compound for pipe thread, called Thread-Tite, is being manufactured in stick form in a convenient "lip-stick" type case by Armite Laboratories, 6609 Broad St., Los Angeles, Cal. Not only does it give a positive seal against gases and liquids at high and low pressures and temperatures, but it lubricates, allowing bolts and studs to be drawn tighter, and then be easily unscrewed after long service.

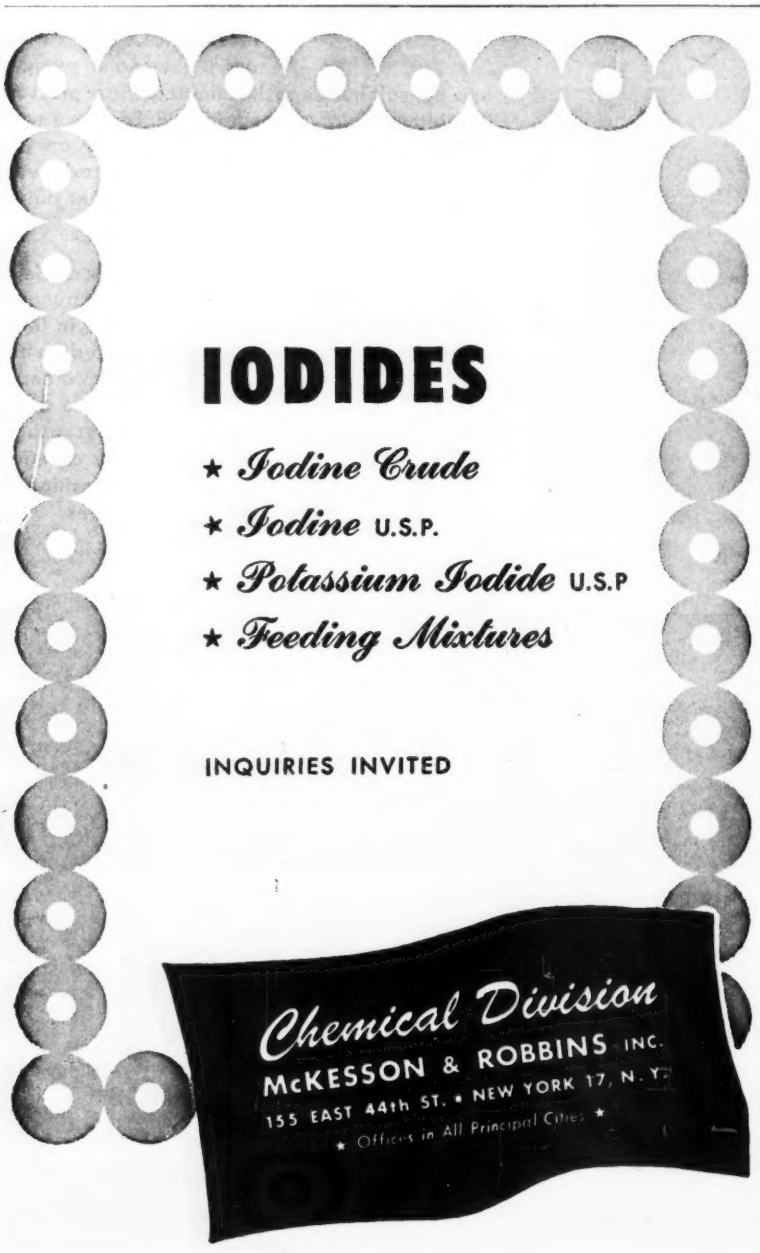
Cattle Spray and Dip

New foe for cattle fever tick now available in larger quantities.

Du Pont's new Cattle Spray and Dip No. 30, which was rushed to production this summer to help cope with the spread of the cattle fever tick in Florida, is now available for wider uses in the U. S. and abroad.

Active ingredients of the new formulation are DDT and benzene hexachloride. They proved effective for the control of cattle fever tick in extensive tests carried out in 1946 by the Bureau of Animal Industry of the U. S. Department of Agriculture in Mexico, in cooperation with Mexican officials and Mexican cattlemen. Later experiments confirmed the results obtained in Mexico.

Anticipated markets are Texas, Puerto Rico, Mexico, and other cattle fever tick countries in Latin America. Du Pont Livestock Dip and Spray No. 30 is also effective against many other livestock pests, and may be used on sheep and goats, on horses and mules. It is convenient to use, because it contains DDT and benzene hexachloride already mixed in the proper proportion, and of the proper particle size for making up sprays and dips.



IRON FREE—RAPID SOLUBILITY

Prove High Quality of Hooker Sulfides

Where you are using or considering using Sodium Sulfide or Sodium Sulfhydrate, you will do well to see how the high purity of these Hooker products can make your work easier and more effective.

Hooker Sodium Sulfide has a maximum iron content of 8 ppm and Sodium Sulfhydrate a maximum iron content of only 5 ppm. In developing these iron free sulfides, Hooker has also been able to keep them remarkably free from other impurities.

Rapid and complete solubility of these sulfides, a result of careful manufacture and high purity means that the clean solution can be used without settling or decanting—a time and material saving that is well worth while.

Large users of sodium sulfhydrate can obtain this Hooker product in liquid form in tank car quantities. It is supplied in concentrations of 37% or 45%.

Send for samples and Technical Data Sheets. Please make your request on your company letterhead.

SODIUM SULFIDE Na_2S

Mol. Wt. 78.1
M.P. .....100°C

Light buff colored solid in flake form. Rapidly soluble in water; slightly soluble in alcohol; insoluble in ether.

ANALYSIS

Na_2S ..... 60 to 62%
NaCl .....1.5% Max.
Other Na Salts ..... 2.0% Max.
Fe .....8 ppm Max.
Cu, Ni, Cr, Mn, Pb ..1 ppm Max.
Water of crystallization
36.5 to 34.5%

USES

In unhairing hides and wool pulling; desulfurizing viscose rayon; in manufacture of dyestuffs, chemical intermediates, paper pulp, soap and rubber, as an ingredient of dye liquor for textile dyeing; boiling out linen; ore flotation and metal refining.

SHIPPING CONTAINERS

Steel drums ..90 and 350 lbs. net

SODIUM SULFHYDRATE NaSH
(sodium hydrosulfide)

Mol. Wt. 56.1
M.P. .....55°C

Light lemon colored solid in flake form. Completely and rapidly soluble in water, alcohol and ether.

ANALYSIS

NaSH .....70 to 72%
Na_2S .....2.5% Max.
NaCl .....0.8% Max.
Na_2SO_3 and $NaHCO_3$ ..0.4% Max.
Fe .....5 ppm Max.
Cu, Ni, Cr, Mn, Pb ...1 ppm Max.
Water of crystallization ..28 to 26%

USES

In unhairing hides, in desulfurizing viscose rayon; in preparation of dyestuffs and other organic chemicals such as thioamides, thiourea, thioglycolic acid, thio- and dithiobenzoic acids, sodium thiosulfate.

SHIPPING CONTAINERS

Flake: Lacquer-lined steel drums, 90, 350 lbs. net
Liquid .....Tank Cars

HOOKER RESEARCH PRESENTS

SULFUR COMPOUNDS

Bulletin No. 9

Looking for a new organic sulfur compound? The answer to your problem may be found in this new Hooker bulletin. It lists typical processes and over 40 different organic sulfur compounds in 9 different classifications. These products are not all being manufactured, but they are all products we know how to make. As they are all typical products, they may suggest other materials of a similar type for which you may be looking.

Hooker does not offer ordinary sulfonations or sulfurized products. We do offer a variety of sulfides, mercaptans, thio acids, thiocyanates and other sulfur derivatives, many of which require our specialized processing ability.

If you have a potential requirement for a new organic sulfur compound, see what we can do for you. Write today on your business letterhead for your copy of Bulletin No. 9, Sulfur Compounds.

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

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NEW PRODUCTS & PROCESSES

Monoglycerides

Higher-purity glycerol fatty acid monoesters have greater dispersing activity.

Glyceryl monoesters of fatty acids are now commercially available with a minimum monoester content of 90% from Distillation Products, Inc., Rochester. Similar mixtures previously on the general market have contained from 30 to 50% monoester.

Addition of only 1¼% of one of the new distilled monoglycerides to the shortening of an experimental cake batter has a greater effect in increasing the volume of the finished cake than addition of 10% of the older type of monoglyceride, DPI found in its baking experiments.

The enhanced properties of the distilled monoesters are primarily due to the high monoester content, but additional benefits are believed due to the absence of diesters, metallic soaps and residual catalyst, and to the low content of glycerol and free fatty acids. Previous commercial methods have been unable to separate all these substances effectively from the surface-active monoesters.

The DPI purification process also removes by-product colors, odors, and flavors; and results in higher melting monoester fats.

The monoglycerides of cottonseed oil, distributed by DPI under the trade name, "Myverol Type 18-85 Distilled Monoglycerides," are said to be the most powerful dispersing surface-active agents of their type. Analytical data are: glycerol content, 2.5% max.; free fatty acid content (as oleic), 1.0% max.; saponification value, 150-160; iodine value, 75-85; color (5¼" Lovibond), 15Y/1.5R max.; M.P., 52°C, 125.6°F (approx.); specific gravity, .93 at 60°C.

The distilled monoglycerides of stearic acid have unusual emulsifying properties which should make them especially useful in the cosmetic and pharmaceutical industries.

Fatty Acids

Stearic acid of 97% purity offers improved properties, better derivatives.

A new series of fatty acids, with true stearic acid content as high as 97% or more, is now being made available to industry by Atlas Powder Co., Industrial Chemicals Department, Wilmington, Del.

The purification of stearic and other hard fatty acids from natural fats is accomplished by a basically new and exclusive process owned and operated by The Trendex Co., Memphis, Tenn., yielding finished products of a quality hitherto unobtainable in commerce.

The process, which is being fully covered by patents, was developed in the laboratories of the HumKo Co., vegetable oil processors, of Memphis. The HumKo Co. has no further interest in the Trendex process, however, except that it has contracted to supply basic raw materials.

Besides improved color, odor and taste specifications, the unsaponifiable matter in the new acids is as low as 0.1% and the average iodine value is well below 0.5. In addition, the acids show exceptional heat stability, so that when reacted with other materials, they produce derivatives of superior quality.

Three high-purity hard acids, differing in uniform proportions of stearic and palmitic acids, are offered. They include 70%, 80% and 97% stearic acids under the brand name of "Hystrene", a trade mark of The Trendex Co.

The new fatty acids should find wide acceptance in the manufacture of cosmetics, pharmaceuticals, candles, metal stearates and chemicals of various types.

Silanes

Three new silanes expand possibilities of organosilicon chemistry.

The supply of industrial organosilicon compounds with good thermal stability and rapid curing time promises to be increased by the availability of three new silanes, vinyltrichlorosilane, diethyldichlorosilane, and phenyltrichlorosilane are available from the Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y. These new silanes can be reacted easily with other organosilicons, alkyd resins, intermediates, and in some cases unsaturated organics, to produce liquid or solid polymers.

The three new silanes, soluble in most organic solvents, are colorless, fuming liquids, with molecular weights ranging from 157.10 to 211.54, and boiling points from 88° to 201° C. The great variety of useful polymers possible with these silanes is due largely to highly reactive Si-Cl groups which can be converted readily to Si-O, Si-N, Si-S, and other groups. All chlorine atoms in these clorosilanes can be replaced. Hydrolysis and condensation reactions using suitable catlysts, yield liquid or solid polymers whose composition and properties can be controlled at will.

Of special interest to producers is that the vinyl group in vinyltrichlorosilane is available for reaction before or after polymerization, a property which opens up new fields of reactions and products. Vinyltrichlorosilane can also be reacted with unsaturated organics, or blended with other organosilicons and intermediates.

These new silanes are available now from pilot-plant production in the following quantities: vinyltrichlorosilane in 1, 5, and 10 lb. containers; diethyldichlorosilane in 1, 4, and 8 lb. containers; phenyltrichlorosilane in 1, 5, and 11 lb. containers. Larger quantities can be obtained upon advance notice.

Briquetted Maleic

Maleic anhydride in briquette form provides easier handling, less hydrolysis.

Maleic anhydride in briquette form is now commercially produced by Monsanto Chemical Co. This new molded form is designed for maximum ease and safety in handling as well as processing efficiency.

The uniformity of the briquettes and the absence of dust and fines, which are screened out, make them particularly attractive to plant men. Moisture pick-up and subsequent hydrolysis are held to a minimum because of the small exposed surface per unit weight. There is no increase in price.

Acrolein and Derivatives

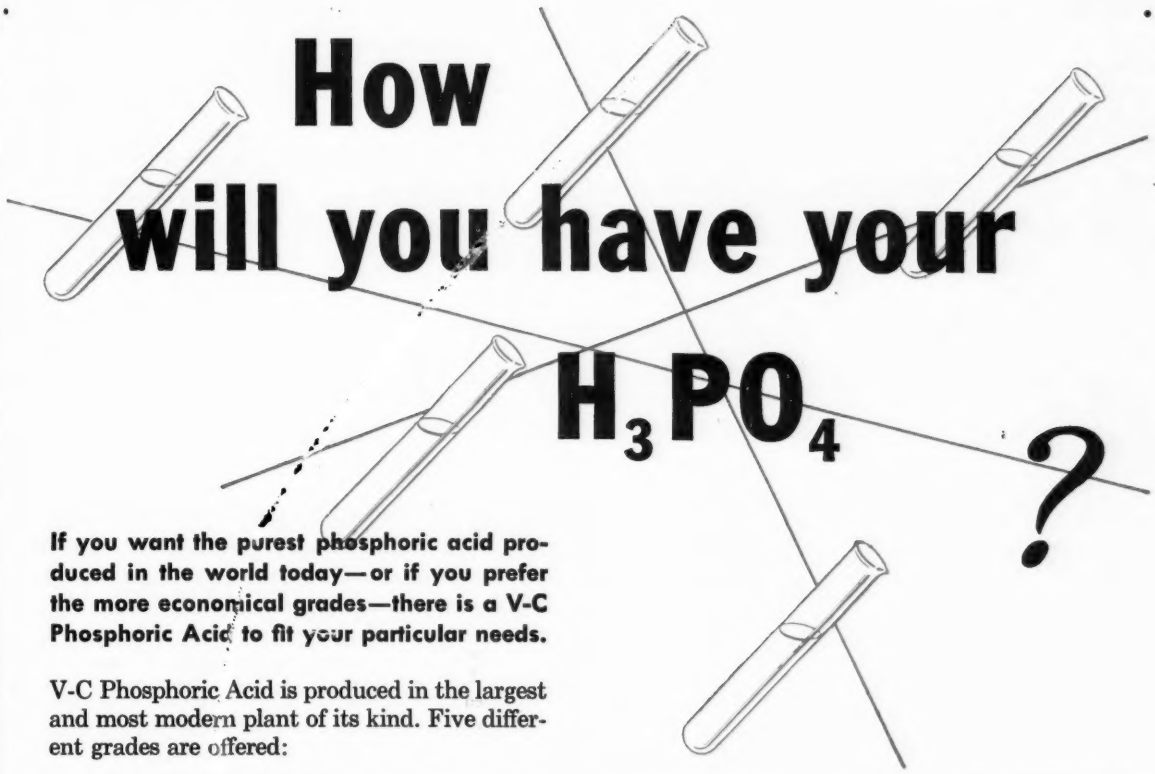
Two companies offer low-cost acrolein, various derivatives.

Acrolein is now being produced in large-scale commercial quantities by Carbide and Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y. It is priced at 50 cents a pound in 55-gallon drum lots f.o.b. Institute, West Virginia. At this new low price, acrolein can be considered for uses that were formerly economically impossible.

Carbide is also supplying many of the primary derivatives of acrolein. Allylidene diacetate, an interesting monomer for polymerization and copolymerization, and ethyl beta-ethoxypropionate, used in the synthesis of Vitamin B_1, are already in commercial production. Process development work is completed and samples of beta-methylmercaptopropionaldehyde (an intermediate for the synthesis of the amino acid, methionine), beta-ethoxypropionic acid, beta-ethoxypropionaldehyde, and beta-chlorpropionaldehyde are available.

By producing both acrolein and its primary derivatives, Carbide will supply not only manufacturers who require large quantities of acrolein itself, but also others whose application will permit the use of an acrolein derivative and thereby avoid their handling a dangerous, unpleasant, and toxic chemical.

Concurrent with reduction in the price



How will you have your H_3PO_4?

If you want the purest phosphoric acid produced in the world today—or if you prefer the more economical grades—there is a V-C Phosphoric Acid to fit your particular needs.

V-C Phosphoric Acid is produced in the largest and most modern plant of its kind. Five different grades are offered:

1. **V-C 85% N.F. Grade** surpasses National Formulary and American Chemical Society specifications and meets all U.S. Food and Drug Administration regulations. This odorless, water-white, sparkling-clear, syrupy liquid is made from elemental phosphorus and has exceptional utility where unsurpassed purity is indicated.

2. **V-C 85% Technical Grade** is a clear, odorless liquid of syrupy consistency, slightly higher in impurities than the N.F. Grade, but with similar physical characteristics.

3. **V-C 75% Food Grade** far surpasses all Food and Drug requirements for this grade. It is sparkling, water-white and odorless.

4. **V-C 50% Food Grade** meets the same high standards as the 75% Grade except that it is more dilute.

5. **V-C 62½% Commercial Grade** is a greenish-brown, "wet-process" acid containing 62½% free phosphoric acid with a relatively high P_2O_5 content due to dissolved phosphates (averages 49%).

Depend on V-C to supply your H_3PO_4 needs—not only because there is a complete line of V-C Phosphoric Acids—but also because you can rely on V-C for speedy deliveries and friendly, helpful service. V-C Phosphoric Acid is shipped in rubber-lined tank cars . . . and in stainless steel drums, barrels and carboys.

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of acrolein, Shell Development Co., 50 West 50th St., New York 20, N. Y., has announced the availability of the following new acrolein derivatives: 2-formyl-2,3-dihydropyran (acrolein dimer), 2-hydroxymethyl-tetrahydropyran, β-methoxypropionaldehyde, β-methoxypropionic acid, 3-methoxy-1-propanol, α-hydroxyadipaldehyde and 1,2,6-hexanetriol. Allylidene diacetate has been available for some time. Methacrolein and a methacrolein derivative α, γ-dimethyl-α-methoxymethylglutaraldehyde are also newly available in research quantities.

Alkyd Molding Compound

Extremely low-pressure molding compound permits shell application to delicate assemblies.

A new addition to the family of alkyd plastics, first introduced a year ago, has been announced by the Plaskon Division of Libbey-Owens-Ford Glass Co., Toledo 6, Ohio. The new material, designated as Plaskon Alkyd 411, is unique among plastics in that it is supplied as a putty instead of the conventional granular or powder form.

The new alkyd material can be molded into finished form at pressures far lower than any other plastic material. Molding pressures as low as 50 psi are being used commercially. (For demonstration purposes, the material can be literally molded by hand and subsequently cured to a hard, heat resistant solid by brief heating.) On a production basis, very lightweight, fast-acting hydraulic or air-actuated presses are employed which carry out the complete molding cycle on a high production basis.

Because of the extremely low pressure requirements, Alkyd 411 is particularly suited to applications where a shell of plastic must be molded around delicate electrical assemblies which would be crushed by the high pressures necessary to mold other plastics. Electrical capacitors, required in very large quantities by the television, radio, and other electronic industries, are a typical use of the new compound. Paper condensers and wound resistors are other successful applications of Alkyd 411.

The new Plaskon Alkyd is supplied to molders in bulk as a putty. At room temperatures it is readily extruded into ribbons or other required shapes which are then cut into individual mold charges. This technique permits molders to preassemble a condenser or capacitor just before molding and to produce an integral piece with all components, including wire leads, sealed into a stable, moisture-resistant, heat-resistant unit.

A new concept of compression molding was introduced to the plastics industry a year ago by Plaskon with its announcement of the family of alkyd molding materials. All members of the family are moldable into finished parts on equipment that is far lighter and less expensive than conventional compression presses. The original alkyd, a granular compound, has gained very rapid acceptance and is now being used in large quantities in the making of television components, switch gear, fuse plugs, terminal blocks and machine parts.

Four machinery manufacturers will shortly introduce molding machines specifically designed for alkyds. Pilot models of these machines are today in commercial use in a number of plants.

Mechanical and electrical properties of Plaskon Alkyd 411 are similar to those of granular alkyd. The new compound, however, has somewhat shorter storage life.

Distilled Red Oil

New premium grade red oil has low color, mild odor.

Ahcolein 810, a new premium grade distilled red oil, has been announced as an additional fatty acid chemical specialty of Arnold, Hoffman & Co., Inc., Providence, R. I. Ahcolein 810 is a high-quality distilled oil, very light in color and possessing an extremely mild fatty odor. Its use is recommended when quality, odor and final color are important factors. Samples and technical data sheets are available, on request, from manufacturer.

Chemical Polishing

Metal polishing without buffing or use of electricity saves steps, lowers cost.

Metal products can be given a bright, reflective surface without mechanical or electrical operations by a new process recently developed by Battelle Institute, Columbus, Ohio.

The product to be finished is merely dipped into a chemical solution. When withdrawn a few minutes later, it is polished to a high mirror-like luster.

The chief advantage of the process in production is its simplicity. Items of intricate form can be quickly polished by dip treatment. The surface obtained may serve as the final finished surface or as a base for subsequent plating. In practice, it has been found that chemical polishing—as the process is called—may eliminate from one to four or five production steps in the finishing of a metallic product. This means a reduction in finishing costs as great as fifty per cent.

Chemical polishing is too new to have permitted discovery of all its potential uses and its limitations. However, it has been used commercially on several products with success. In the case of a luggage lock manufacturer, the process has eliminated five buffing operations in finishing locks and hasps. A savings of about 65 dollars per 1000 locks and hasps has resulted.

Metals that can be chemically polished successfully include brass, copper, nickel-silver, Monel, nickel, and aluminum. The action in each case is a true polishing action and the reflective surface obtained is in the polished base metal—not a deposited coating of a different metal.

Chemical polishing baths are mixtures of acids, the basic ones being phosphoric, nitric, and acetic acids. They operate at temperatures from room temperature to 200 degrees Fahrenheit. At the lower temperature, action of the bath is slower, and longer immersion time is required. Immersion periods vary from 10 seconds to 10 minutes, depending on the initial finish of the surface being treated, the final finish required, and the operating temperature of the bath.

Following the polishing dip, the work is rinsed and dried. If it is desired to plate over the chemically polished surface, this may be done without further treatment of the surface.

Stearate for Grease

New aluminum stearate is economical, gives uniform, stable greases regardless of manufacturing temperature.

A new aluminum stearate called #22-G Grade has been developed specifically for the grease industry by the Witco Chemical Co. of New York.

This new stearate possesses extremely high gelling characteristics, and from the standpoints of yield and economy is said to be unequalled.

Greases manufactured during extremely hot or extremely cold weather are uniform, whereas it is quite common in the grease industry to secure a wide variation in physical properties depending upon the temperature of the plant at the time it is produced. This new aluminum stearate eliminates the major manufacturing problem for volume production.

Stability of greases containing #22-G is excellent, less bleeding during storage, and even extreme working of 100,000 strokes does not change penetration values appreciably from those obtained after 5,000 strokes. Those grease concerns which are equipped with the proper type of working equipment will find #22-G offers extremely high yield with any type of base oil regardless of origin.

The quality of Witco Aluminum Stearate #22-G has been established in the grease industry on the basis of many production runs.

Wax Improver

Styrene copolymer imports improved properties to wax formulations.

Arcco 1071-6C, a new styrene-copolymer resin emulsion addend that greatly improves floor wax, is now in production by American Resinous Chemicals

ORONITE CHEMICAL COMPANY

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THE NAME TO WATCH IN CHEMICALS

ORONITE POLYBUTENES... BASIC INGREDIENTS FOR A VARIETY OF PRODUCTS

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NON-DRYING PUTTIES

Oronite Polybutenes are highly stable and resistant to oxidation. They possess high dielectric strength, low power factor and good moisture resistance. Their inherent tackiness gives close control of "quick grab"—"legs" and removal characteristics. They can be emulsified, and, in conjunction with resin emulsions, can be used as extenders and modifiers of latex. Your inquiry as to specific use will bring prompt reply.

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824 WHITNEY BLDG., NEW ORLEANS 12, LOUISIANA

Corp., 103 Foster St., Peabody, Mass. By adding six parts dry weight of the resin emulsion to 100 parts any weight of any standard emulsion wax, anti-slip properties are improved, color of liquid wax is lightened, wearing qualities increased and production costs lowered.

As an aid in formulating on a production basis, Arcco 1071-6C is added directly to the floor wax emulsion. Sufficient water is then added to reduce solid content to the specifications desired.

Arcco 1071-6C is supplied as a 32% solids emulsion weighing 8.75 pounds per gallon and has a pH of 10 to 11. Shipments are made in carload, ten-drum, one-drum or less-than-drum lots. Samples or trial lots are available.

Polyester Plasticizer

Product combines low viscosity, light color and wide compatibility.

A new polyester plasticizer, said to combine many desirable properties of both the monomeric and polymeric types, has been put into full plant-scale production by the Resinous Products Division of Rohm & Haas Co. Designated Paraplex G-60, the new product is characterized by low viscosity, high plasticizing efficiency, good behavior at low temperatures, light color, broad compatibility and low cost.

As a plasticizer in polyvinyl chloride compounds, G-60 brings low-temperature flexibility to polyvinyl sheet and film stocks. It has demonstrated its usefulness in vinyl dispersion compounds such as organosols and plastisols. Also, it has been found to exert a unique and useful stabilizing action on PVC type resins, producing compounds which appear to offer significant advantages by eliminating such objectionable characteristics as staining, opacifying, and spewing.

Properties of the new Paraplex permit economical formulation of vinyl lacquers of high quality.

Still another major use is as a combination plasticizer-stabilizer of chlorinated compounds. For instance, low concentrations of Paraplex G-60 have been found to improve the film length, adhesion and heat stability, and to increase the film toughness of coating compounds such as chlorinated rubber.

Tetrahydrophthalic Anhydride

Alicyclic double bond in phthalic analog offers greater functionality in reactions.

Cis-Δ-4,5-tetrahydrophthalic anhydride is now available from Jasons Drug Co., 1085 Myrtle Ave., Brooklyn, N.Y. The compound is a white, free-flowing powder with a melting point of 102-4°C. This dibasic acid, although similar to phthalic anhydride, has greater functionality because the double bond may be made reactive under certain conditions. The acid will therefore offer somewhat different properties from phthalic. Tetrahydrophthalic anhydride has possibilities of being used for the preparation of plasticizers, alkyd resins, modified and synthetic oils, wetting agents and detergents, in the preparation of pharmaceuticals, and as an intermediate in organic synthesis.

Chlordane Emulsifier

Quaternary ammonium emulsifier produces stable or quick-break emulsions at low concentration.

Armour Chemical Division, 1355 W. 31st St., Chicago 9, Ill., is making a new cationic emulsifier for chlordane and other agricultural insecticides. The product, trade name Arquad 2C, produces, through minor formulation adjustments, either stable or quick-breaking emulsions. Arquad 2C is effectively used in much lower concentrations than other commonly used emulsifiers.

Arquad 2C is an oil-soluble quaternary ammonium compound with excellent surface active properties. One of its many characteristics is its ability to act as a "surface oiling" agent bonding the oil phase to surfaces contacted by the emulsion.

Synthetic Wax

Alkyl stearamide permits low-cost wax formulations.

A new synthetic wax, Ceramid, is now available in commercial quantities from Glyco Products Co., Inc., 26 Court St., Brooklyn, N. Y., and Natrium, W. Va. Chemically it is an alkyl stearamide. It is hard, light yellow in color and melts at 79.5°-80.5°C. It is insoluble in water and is more soluble in organic solvents than natural and other commercial synthetic waxes. Absolute alcohol will dissolve 5.4 grams per 100 cc. In toluol and naphtha 3.8 and 3.4 grams, respectively, can be dissolved.

Ceramid is compatible, in varying proportions with asphalt, carnauba wax, cumarone resins, ethyl cellulose, microcrystalline wax, paraffin wax and Acrawax C.

Its use is indicated for protective coatings and films to be deposited on various surfaces out of solvent solution. It emulsifies readily to give a white matte finish which can be rubbed to give a high polish. It may be used as an anti-tack agent for resin organisols; as a mold lubricant for rubber and plastic goods; and to prevent sticking of finished articles. In most lacquers and enamels it dissolves clearly and serves as a flatting or gloss reducing agent. In polishes, insulating compounds, etc., it is used in blends with other waxes and hydrocarbons for special effects.

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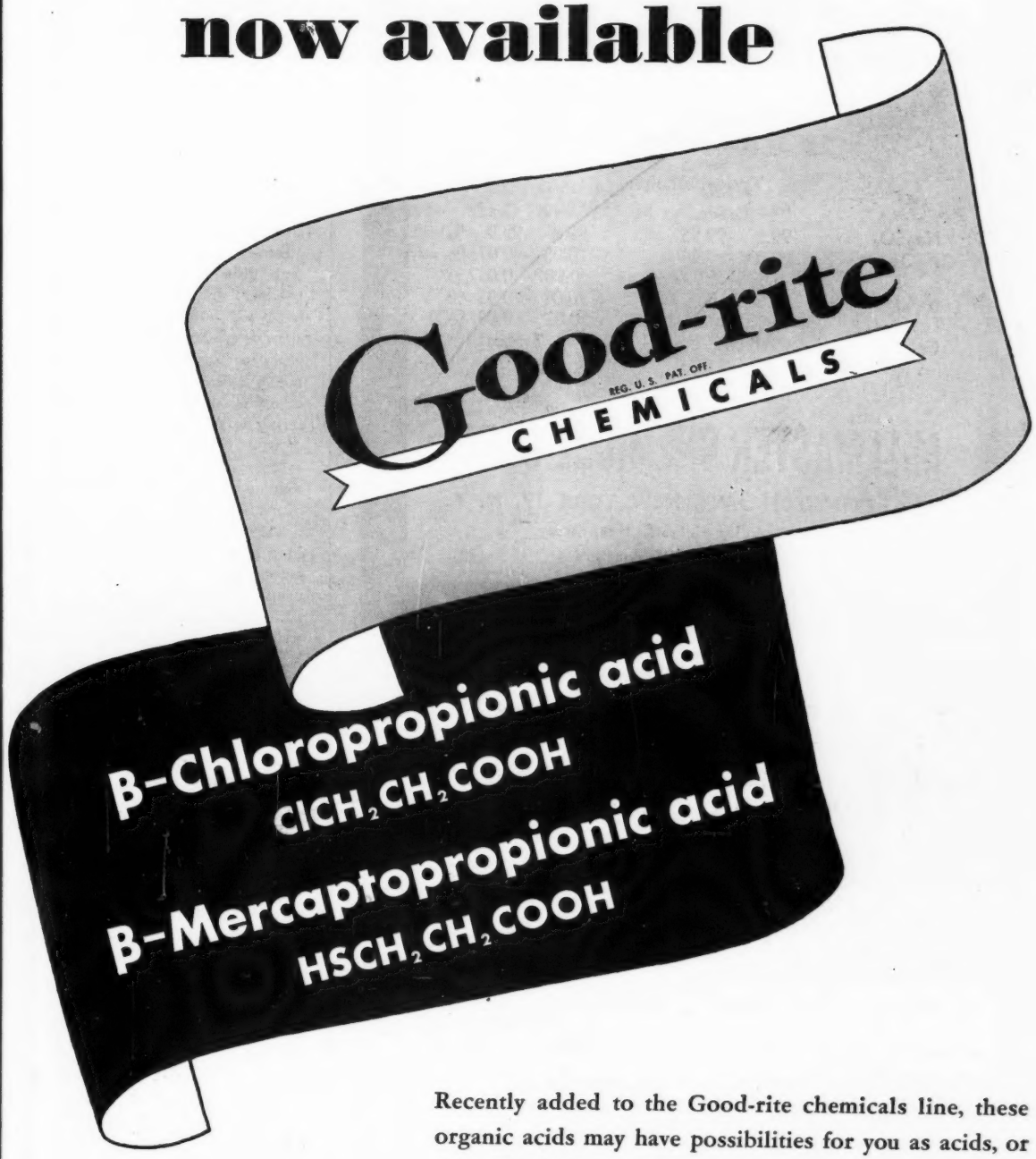

Recently added to the Good-rite chemicals line, these organic acids may have possibilities for you as acids, or as intermediates to form esters, amides or salts. Write for technical data. Please address Dept. CC-12, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

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GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

IMPORTED SODIUM SULPHATE

(Glaubers Salt)
Anhydrous

Typical Analysis

	"R" Grade	"VH" Grade
Na_2SO_4	99.9 -99.95	99.8 -99.9 %
H_2O	0.03 - 0.04	0.05 - 0.07 %
R*	0.006- 0.009	0.009- 0.012%
NaCl	0.005- 0.007	0.01 - 0.03 %
Fe_2O_3	0.007- 0.01	0.02 - 0.03 %
CaO	None	Traces
pH	About 6	6-7

*Residue insoluble in acid

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Plant and Main Office:
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New York Office:
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It can be used for waterproofing textiles, paper and leather. Since it is slower burning and higher melting than paraffin wax, it should be of interest in slower burning, dripless candles.

Its low price, 30¢ per lb. in drums, indicate its economy.

Dispersing Agents

Surface-active agents are acid esters of polybasic acids and their amine salts.

The Hypodynes are being offered by Ferro Chemical Corp., Bedford, Ohio, to the general market after a long period of use in a variety of applications. Possibly of greatest interest is the fundamental property of functioning as a potent dispersing agent for association polymers of high polarity. Further, they have been found to exhibit surface tension lowering and interfacial tension lowering comparable to that produced by highly active surface-active agents. However, the outstanding ability of these materials to disperse aggregates or micelles of polar substances, especially in organic systems, is superlative as compared with that of commercially available chemicals of many types.

The dispersive abilities, for example, have been utilized to alter the flow characteristics of vinyl dispersions, paint pigment concentrates and aqueous silicate systems and to solubilize high molecular weight organic materials which otherwise have proved insoluble in many solvents.

The unsaturated nature of the compounds make them especially attractive in formulations of film-forming materials, such as specialty drying oils, alkyds and other polymeric synthetics, since they tend to eventually become an integral, though small, part of the system involved.

Citric for 2,4-D

Citric acid prevents precipitation of 2,4-D amine salts in hard water.

Citric acid has recently found another usage far removed from its more familiar applications, according to Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y. It has been established as an economical and stable sequestering agent to prevent the precipitation of 2,4-D salts by hard water.

The preparation of 2,4-D amine salt concentrates for herbicidal purposes has become quite general. When used in hard water areas, a heavy precipitate forms upon dilution. Approximately ¾ oz. of citric acid per pound of 2,4-D included in the concentrate will provide protection against precipitation in water of 1,000 p.p.m. hardness. (Proportionally larger quantities are necessary for harder waters.) Since the citrate serves to complex the metal ions in the water, the 2,4-D is left in its soluble state and able to act with 100% efficiency.

Naphtha Process Wool Scouring Preferred by America's Largest Wool Grease Producer

Superior Wool and Wool Grease Result from Process Used Successfully for over 50 Years

Though the bulk of the nation's wool processors still scour wool by the traditional "soap and water" emulsion process, William Whitman Co., Inc., Arlington Division has been using the Naphtha Process with outstanding success for more than half a century. As the nation's largest single recoverer of wool grease, Arlington prefers solvent extraction as a more efficient method of recovering the grease. It also improves the strength and softness of the finished wool.

3 Steps in Extraction

Arlington uses two batteries of kiers, or digesters, with a total capacity of 10,000 pounds. After the kiers are loaded, they are sealed and the air is pumped out to a 25-inch vacuum.

In the first step, the wool is in contact with 5,000 gallons of twice previously used Esso Hexane, until this solvent is saturated with wool grease. After this naphtha is emptied, 2,000 gallons of intermediate naphtha (used once) is then introduced into the kiers and kept there for a certain time interval. When this intermediate Hexane is emptied, 3,000 gallons of pure Hexane is then used. This completes the degreasing procedure. After all the free liquid has been drained off, the final traces of solvent left in the wool are driven out with a heated inert gas and finally vacuum dried.

***Naphtha Process** wool scouring produces superior quality tops and yarns.*

Wool grease is used in compounding lubricants, greases, rust preventives, cutting oils, in leather and fur dressing products, and as a basic ingredient for animal vitamins such as irradiated cholesterol.

Esso Hexane Now Used at Arlington Mills

In the early history of this process, wide-cut petroleum solvents were used. Since early 1948, however, Arlington has used Esso Hexane, one of the new, highly refined close-cuts. Featuring a boiling range of less than 15°F and a high degree of purity, Esso Hexane costs no more than many solvents with much wider boiling ranges.

Esso offers a large selection of solvents with a variety of evaporation rates. Our technical men will be glad to analyze your solvents problems without any obligation. For further information on Esso Solvents, drop a line today to our sales office nearest your plant.

Aliphatic Hydrocarbons Cut Costs in Ethyl Cellulose Lacquers

To prevent yellowing of finishes in blonde and bleached wood furniture, the lacquer base of nitrocellulose is replaced with ethyl cellulose. The preferred solvent combination consists of 70-90% aromatic hydrocarbons with 30-10% alcohols. For even more economical solvent mixtures, petroleum distillates such as Esso Heptane and Esso VM&P Naphtha can be used to replace a high percentage of the aromatics. An excellent combination for uniform evaporation is isopropyl alcohol used in conjunction with Solvesso Toluol and Esso Octane.

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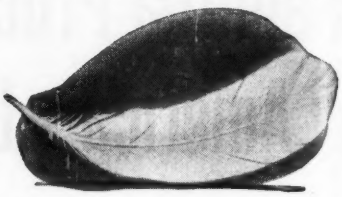

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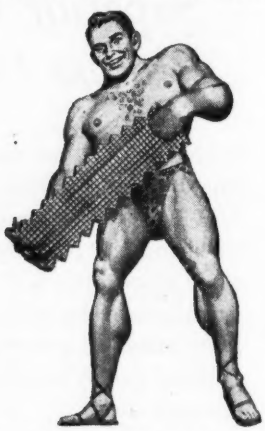

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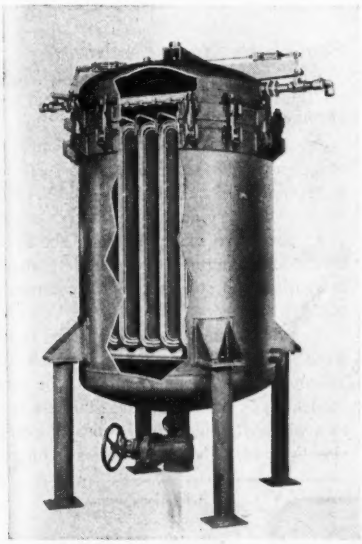
NEW EQUIPMENT

Self-Cleaning Filter

Automatic cleaning reduces downtime and labor, eliminates filter cake handling.

Automatic sluicing of filter cake is now made possible through the development of the Niagara "Auto-Sluice" filter by the Niagara Filter Corp., Buffalo, N. Y. This filter permits completely automatic cake removal and disposal, eliminating the need for opening the filter at the end of each cycle to sluice the cake from the leaves.



The "Auto-Sluice" is built into the filter cover and consists of a header into which high-pressure spray nozzles are fitted. These are so positioned that the sprays of sluicing liquid strike the cake of each leaf. Air motors impart both rotary and reciprocating motion, assuring thorough cleaning of all surfaces. Simple adjustments provide regulation for speed and limits of the movements of the header.

Performance records of the "Auto-Sluice" in actual service show that filter cakes up to 35 ft.^{3} can be removed in as little as 15 minutes with only 70-100 ft.^{3} of water consumed.

Niagara "Auto-Sluice" Filters are available in sizes from 120 to 500 sq. ft. of filter area and can be built in steel, stainless steel, various alloys and other commercially available materials of construction.

Air-Powered Mixer

Safety, variable speed, and discharge under pressure are features of new mixer.

The Union Tool Corp., Warsaw 3, Indiana, has developed a mixer said to be ideal for handling inflammable or explosive materials since the unit is driven by an air cylinder. As a result, there is no static and the mixer is non-sparking.

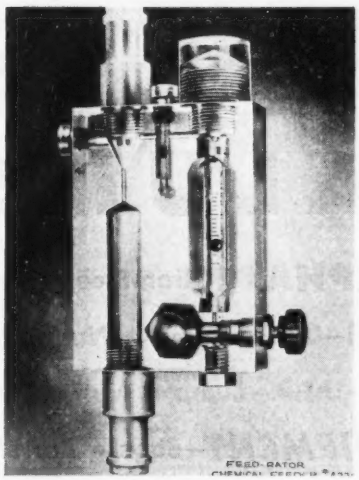
Mixtures can be discharged under pressure, with beater in motion, for delivery through piping to point of use. Tight sealing clamp on lid or top is quickly removed for flushing out vessel and line or for depositing batch to be mixed. Mixes which tend to separate on standing are readily kept in solution in the Union mixer by keeping the agitator in motion during the discharge cycle.

It is available jacketed for circulation of either hot or cold water. Air motor of unit operates efficiently and at full speed range at pressures from 30 to 125 lbs. At 50 lbs. pressure in a ¼" line, speed can be varied from 0 to 90 oscillations per minute. Available in standard models of 10 and 20 gallons capacity, special sizes to order.

Chemical Feeder

Compact unit of acrylic plastic permits accurate feeding of corrosive chemicals.

A new compact, self-contained chemical feeder (the "Feed-Rator") is now available from the Fischer & Porter Co., Hatboro, Pa. Of transparent acrylic plastic (measuring about 10" by 5" by 2" overall) this unit simultaneously controls, meters and dispenses relatively small amounts of bactericides, catalysts, disinfectants, fungicides, inhibitors, reagents and other chemicals into a larger stream. The built-in eductor takes the place of a pump, and many highly corrosive chemicals can therefore be fed directly from a container.

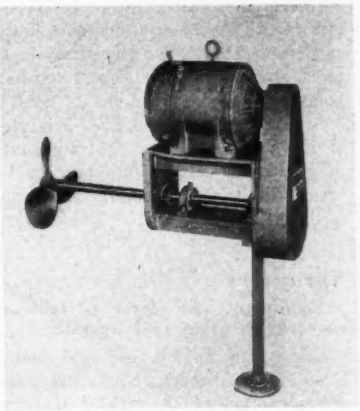


The unit will treat up to 7,000 gallons per day of water directly. In a bypass arrangement, using a solution containing 5% active reagent by weight, 5 parts per million of the reagent can be delivered to over 14,000,000 gallons of water per day.

Side-Entering Mixer

Fabrication rather than casting of new mixer makes for economy.

The H. K. Porter Co., Inc., Pittsburgh 22, Pa., is now manufacturing a new, modern, low-priced side-entering mixer that is especially designed for use in the chemical and process industries.



The Porter side-entering mixer is available for either direct drive or V-belt drive. Either of these models solves the problem of repacking the stuffing box without draining the tank or loss of valuable liquid. This is accomplished by a patented self-sealing shaft.

Another notable feature of these units is the fact that they are fabricated, which permits the use of various alloy materials such as all grades of stainless steel that can not be obtained from casting suppliers. For example, on stainless-steel units, the shaft, propellers and gland are solid stainless, while the body is steel with a stainless-steel face plate welded to the steel body. As a result of this feature, units can be produced at a very moderate price.

Junior Filter Pump

"Pint-sized" filter pump units filter small quantities, expensive solutions without loss.

Sethco, 105-07 150th Street, Jamaica 4, New York, has a new line of pint-sized filter pump units, in various models, that are recommended for either continuous or periodic filtration of all industrial solutions. Less than two minutes are required to set them up, and filter tube replacements are long lasting and inexpensive. They are of special interest to laboratories or plants filtering small batches of industrial solutions.

Model LSU-5 is equipped with a type 316 stainless steel pump and a lucite filter. This model comes complete with a motor, pump and filter mounted on an indestructible, laminated, plastic panel. The

110 volt motor operates on either AC or DC and the entire unit weighs only twenty pounds, making for easy portability. The maximum head developed is equivalent to a pressure of 18 pounds per square inch.

The filter tube is made of specially processed resistant cotton yarn, wound around a stainless steel core. This tube will remove coarse and finely divided impurities, as well as colloidal solids from the solution being filtered.

One of the distinct advantages of this unit is that small quantities of solutions as well as expensive solutions may be filtered without any loss. The filter itself holds approximately one pint of fluid.

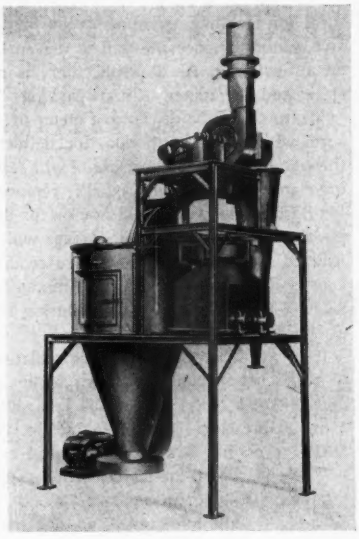
Sethco's Filter Model LSU-5 is rated at 50 gallons per hour. Filtration rates of greater or lesser flows may be obtained merely by adjusting the pinch valve in the line.

Spray Dryer

Semi-plant size dryer is low-cost, easy to assemble and operate.

Bowen Engineering, Inc., 100 Station Road, North Branch, N. J., has added a new spray-drying unit for moderate production and pilot-plant operation with a production rate of two to seven tons per day.

The new unit, the Number 2 Spray Dryer, is extremely compact, occupying a floor space only 10′ x 15′; overall headroom 23′. The entire dryer design is developed with a view to reduced field erection. The drying chamber is shipped



as an assembled unit, while structural steel framework is sectionally shop welded and requires bolting in but six sections.

Special emphasis has been placed on the development of this spray dryer to meet the requirements of the purchaser with a limited budget. The Number 2 unit is easy to clean, simple to operate, and relatively inexpensive. It has all the main elements of Bowen high-tonnage spray dryers, consisting essentially of a heater, drying chamber with Bowen high-speed spray machine, collection system and fan. The equipment is instrument-equipped for simplified semi-automatic operation. It contains recording instruments for inlet and outlet temperatures as well as controls for over temperature and inlet temperature. Heat sensitive materials can be "shock cooled" by admitting cooling air through patented Bowen side air inlets.

Stainless Steel Exchanger

Contamination and corrosion avoided by stainless steel in new heat exchanger.

An all-stainless steel heat exchanger is now being mass produced by Ross Heater & Mfg. Co., Inc., Buffalo 13, N. Y. Immediate delivery and low unit cost of this new model are made possible, according to the manufacturer, by complete standardization and stocking of all component parts.

Identical in design and capacities to the Ross Type BCF exchangers which are all-copper and copper alloys, the new model, Type SSCF, utilizes stainless steel to avoid contamination of fluids or corrosion by fluids. The SSCF series is offered

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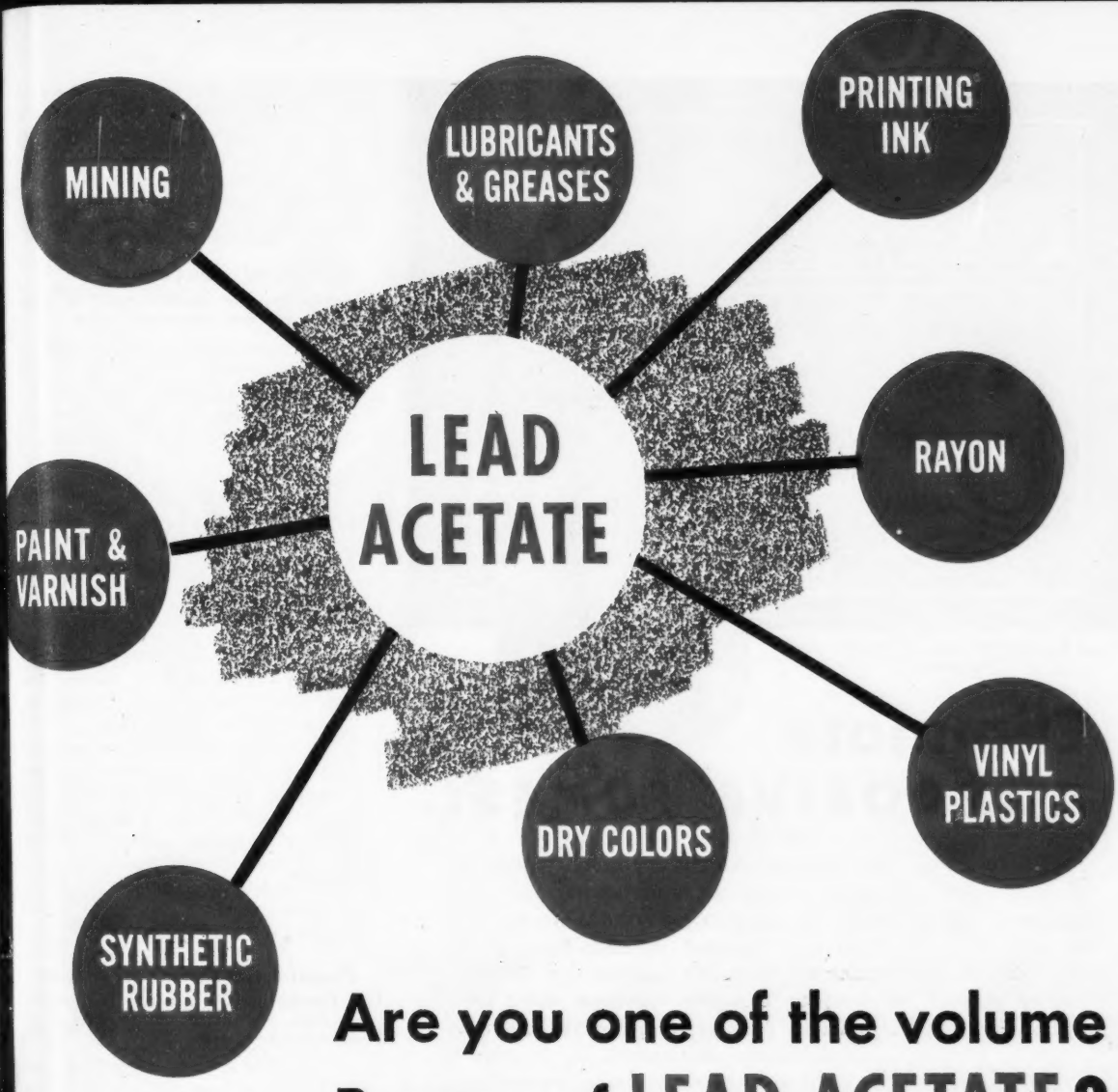

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Big volume users of Lead Acetate know the name, J. T. Baker Chemical Company, well. They know that the physical and chemical uniformity of this product aids in smooth plant operation.

Baker's popularity among big users of Lead Acetate stems from its unique position as a prime producer of Lead Salts for more than 20 years and its background in chemical exactness—practiced for nearly a half century.

If you purchase Lead Acetate or other Lead Salts in volume, investigate Baker quality and Baker prices. Our increased facilities will enable us to care for a number of the more exacting buyers.

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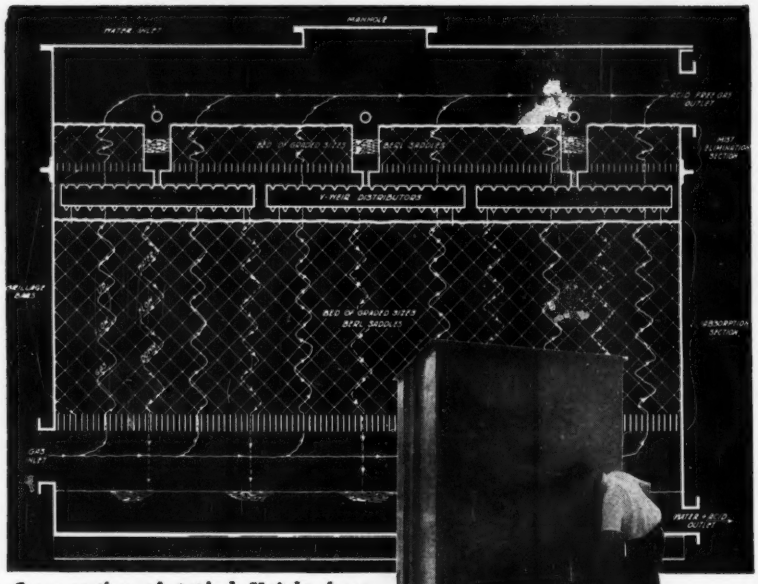
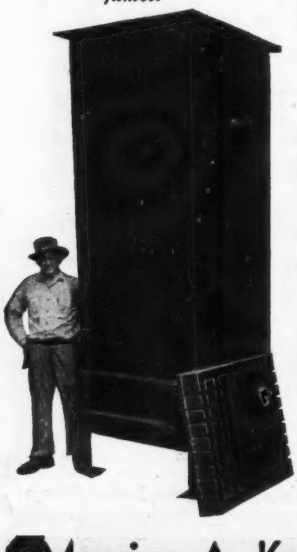


Cross section of typical Knight fume washer.

Eliminate CORROSIVE FUMES!

In designing Fume Washers Knight engineers consider individual space and weight limitations, water consumption and fan power, as well as service conditions involved. The result is an engineered functional unit "tailored" to meet your specific requirements. Of Pyroflex or Permanite Construction (depending on service) for complete corrosion resistance, these units utilize Berl Saddles to insure peak performance. Although individually engineered for maximum efficiency, Knight fume washers are relatively low in cost and economical in operation. Some of the jobs handled by these complete functional units include:

Permanite-constructed unit for handling hydrochloric acid fumes.



Removal of HCL fumes
Removal of chlorine fumes
Removal of hydrofluoric acid fumes
Removal of dust from exhaust gas
Production of dilute muriatic acid
Cooling hot acid gases for processing
Suppression of oil and acid mists
Cooling and removing dust from gases and many other types of service.

When writing for information please include full details regarding service conditions.

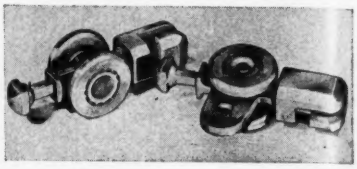
Maurice A. Knight 212 Kelly Ave., Akron 6, Ohio
Acid and Alkali-proof Chemical Equipment

in a complete range of sizes tested to 450 psi. While type 316 stainless steel is standard, SSCF exchangers can be made also from any of the other well known types of stainless steel, although such special orders lose the benefit of immediate shipment.

Overhead Conveyor

New type of chain feature of overhead universal conveyor.

A specially designed chain consisting of links that connect to form a universal joint is said to provide 2 to 3 times the carrying capacity of similar type overhead conveying systems. This chain is



featured in the Un-O-Veyor overhead conveyor manufactured by Michna Systems, 5051 S. Western Ave., Chicago, for light and medium load conveying.

The malleable iron link and universal joint is formed into one integral unit and a clevis is arranged at multiples of 9 inches. Each link has a set of two 2" diameter hardened steel ball-bearing wheels, the load carrying wheel being vertical and the next link with its wheels horizontal to carry the thrust around corners.

Pneumatic Power Operator

Control device operator features reversible pneumatic motor and gear-driven screw stem.

A new type of pneumatic power operator for valves, dampers and other control devices, called the Rotomotor, is now being introduced by Conoflow Corp., 2100 Arch St., Philadelphia 3, Pa. The operator is unique in that it employs a reversible pneumatic motor and gear-driven screw stem. It combines the features of a self-locking stem, simple, continuously connected handwheel, extreme sensitivity and small, compact size.

Additional Rotomotor features are accurate positioning to within 1/500th part of stem travel; sensitivity to instrument changes as low as .025 psi; high stability; stem loads up to 10,000 lb.; stem travel up to 20"; stem speeds up to 12" per minute; adaptability to any type of heavy duty throttling control application.

• Manufacture of a new *heat and cold resistant glove* for industrial use has been started by Pioneer Rubber Co., Willard, Ohio. This glove, the "Hot 'N Cold," has been developed for use where a liquid-tight glove with resistance to extremely hot and cold temperatures is required.

Of red neoprene, Hot 'N Colds have

Come to POWELL for ALL your Valves

Fig. 2453-G—Large 150-pound Stainless Steel O. S. & Y. Gate Valve. Sizes 5" to 30".

Bellows Sealed "Y" Valve. Designed for high vacuum service and for installations where packing is unsatisfactory or fails frequently. →

There are obvious disadvantages in buying flow control equipment from several different sources. Then why get your bronze or iron valves from one place, your steel valves from another, and possibly corrosion-resisting valves from several others, when Powell *makes them all**?

This is an age of specialization; and whereas various manufacturers are emphasizing valves that meet certain flow control requirements, Powell specializes in making valves to meet *all* the demands of every branch of Industry. And there's only one standard of quality at Powell—to make the right valve to suit the service, and to make it the best.

Plants representing every branch of Industry have found that it pays to make Powell—and *only* Powell—responsible for the performance of all their flow control equipment. So why not come to Powell for all *your* valve requirements?

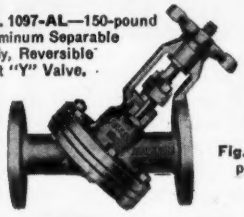


Fig. 1097-AL—150-pound Aluminum Separable Body, Reversible Seat "Y" Valve.

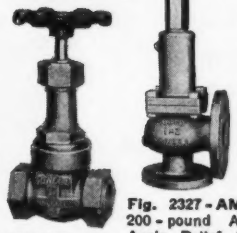


Fig. 1832-IN—200-pound Inconel Gate Valve.

Fig. 2327-AMP—200-pound Ampco Angle Relief Valve with enclosed spring.

Fig. 1886—Screwed End Liquid Level Gauge. Offset Pattern.

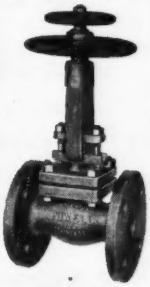


Fig. 1979 S. W.—150-pound Stainless Steel Globe Valve, equipped with Powell Patented Seat Wiper.

Fig. 1843—Monel Metal Swing Check Valve.

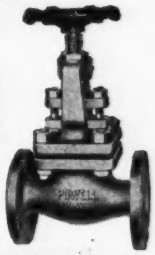


Fig. 1969-NI—150-pound Nickel O. S. & Y. Gate Valve.

Fig. 560—200-pound Bronze Regrinding Horizontal Swing Check Valve.

Fig. 1503—Class 150-pound Cast Steel O. S. & Y. Gate Valve. →

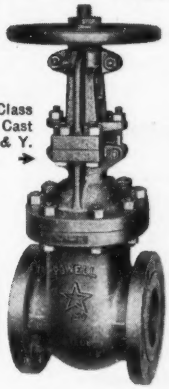


Fig. 1708 — 200-pound Bronze Globe Valve with renewable stainless steel seat and regrindable, renewable "Powellium" nickel-bronze disc.

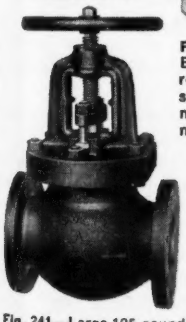


Fig. 241—Large 125-pound Iron Body Bronze Mounted O. S. & Y. Globe Valve.

Fig. 375—200-pound Bronze Gate Valve with renewable wear-resisting "Powellium" nickel-bronze disc. →

Flush Bottom Tank Valve. Available in two designs. Fig. 2309—disc rises into tank to open; Fig. 2310—disc lowers into body.

Fig. 1793—Large 125-pound Iron Body Bronze Mounted O. S. & Y. Gate Valve.

*The Complete Powell Line includes Globe, Angle, Gate, Check, Relief and Flush Bottom Tank Valves in Bronze, Iron, Steel and a wide range of Corrosion-Resisting metals and alloys.

Ask your nearest Distributor—or write direct

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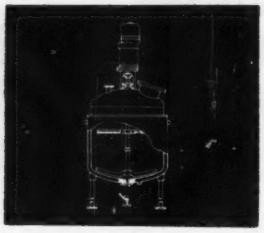
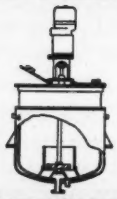
POWELL VALVES

*5 *Patterson-Kelley Solutions to your Kettle problems*



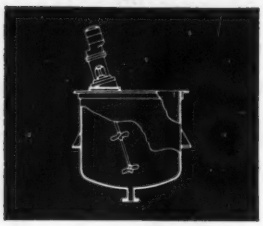
A Kettle with modified paddles

General purpose mixer for heavy materials.



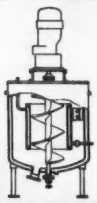
B Asbestos Mixer

With draft tube and turbine; adaptable also for use in mixing other fibrous materials.



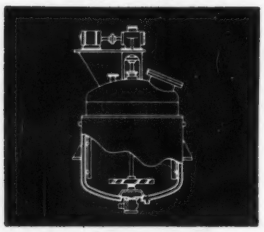
C Open Top Mixer

Suitable for a variety of mixing operations involving liquids up to medium viscosity, or for keeping light solids in suspension.



D Soap Crutcher

Used for mixing and blending soap in paste form; also suitable for other pasty or fibrous materials.



E Kettle with turbine and baffles

Suitable for mixing liquids of low or medium viscosities, slurries; for suspending heavy solids; good for dispersions and rapid dissolving.

Patterson-Kelley offers, without obligation, its accumulated experience to recommend the most suitable design and material for specified operating conditions.

*First of a series of kettles and their applications.

The please send your process equipment catalog

Patterson-Kelley Co., Inc.

14 Lackawanna Avenue
East Stroudsburg, Pa.

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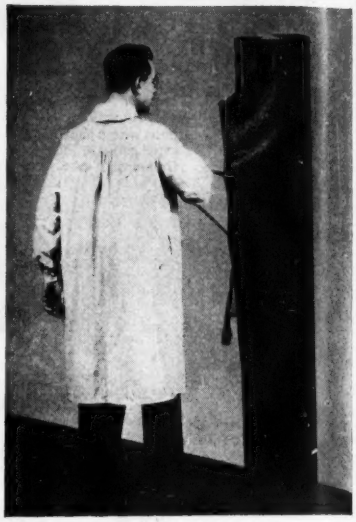
curved fingers and wrist-length gauntlets. The insulating lining is made up of several layers of wool fleece. Tests of the gloves proved them usable in temperatures as high as 314° F., and as low as —85° F.

• Industrial Products Co., 2753 N. Fourth St., Philadelphia, Pa., has introduced a new roller type *fire blanket* for



use in chemical laboratories, oil refineries, paint spray lacquer rooms and other locations where the hazard of clothing catching fire is present.

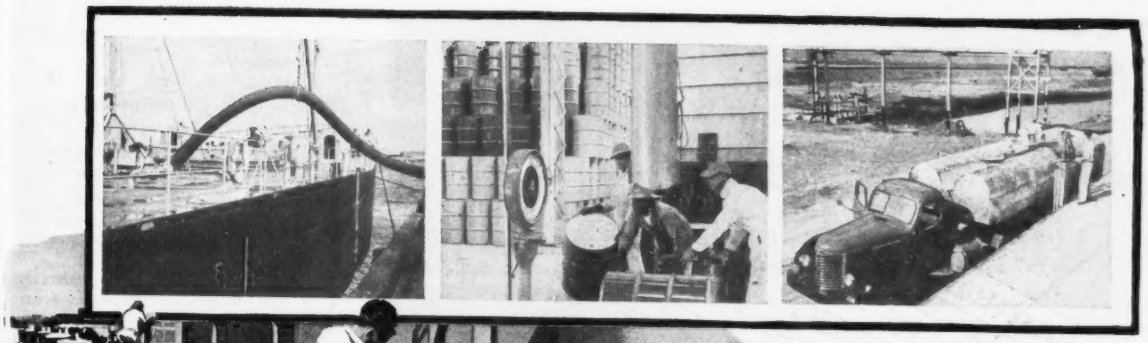
One arm is put through the blanket loop and a turn of the body is all that is necessary. End of blanket automatically detaches from roller. The blanket is treated to make it fire retarding and mothproof.

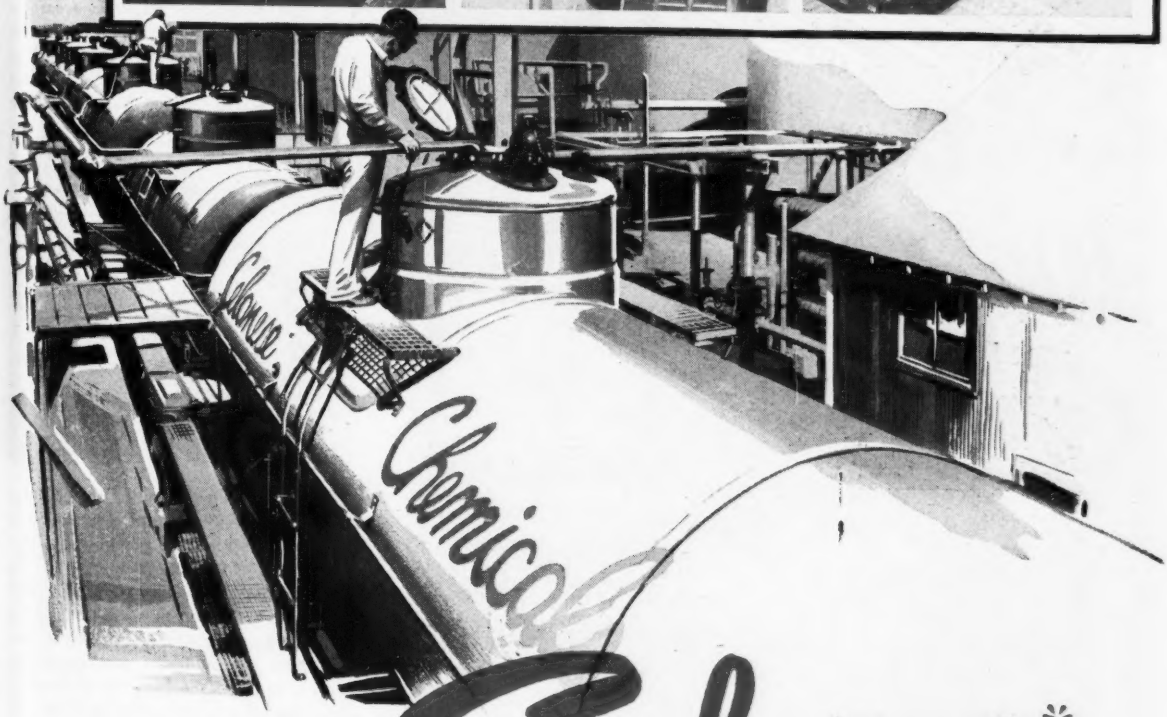
Roller assembly is rugged, free operating and is mounted within a heavy gauge, specially designed, quick opening metal container, which fastens to the wall.

• A new *radiation pyrometer,* the Pyrovisor, has been developed by The Bristol Co., Waterbury 20, Conn. The new instrument indicates, records, or controls temperatures up to 4000° F. in furnaces and kilns.

The Pyrovisor radiation unit, which is the temperature-sensitive head, is mounted on the outside of the furnace or kilns, away from the hot zone, and picks up radiant energy emitted from the surface of the object under measurement. In this way, actual surface temperature measurements of the work are obtained, rather than the usual furnace atmosphere temperatures. A 99% response to a temperature change within one second is claimed.

• A new line of *humidifying units,* suitable for atomization of water, chemicals, insecticides, perfumes, and the like, is being marketed by the Paasche Airbrush Company, 1909 Diversey Parkway, Chicago. Claimed to be an inexpensive but dependable moisture and humidity con-





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PROPYLENE GLYCOL
ISOBUTANOL
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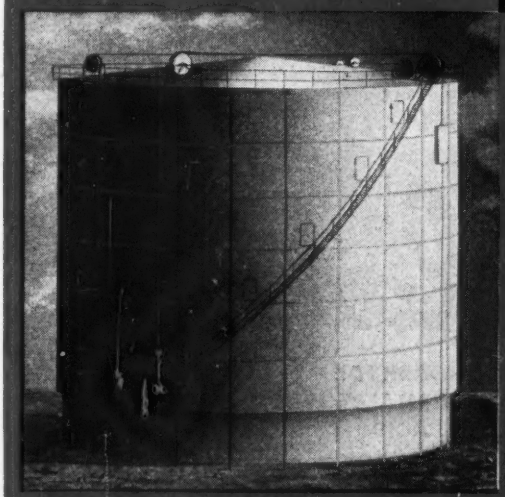
SAFER

INSPECTIONS STORED GAS COMMUNITIES

with the new Dry Seal

Wiggins Gasholder

NO WATER! NO GREASE! NO TAR!



Toxic or explosive mixtures can't accumulate outside the storage space!

Moving parts are weather protected. No snow or ice pads to fight. Piston can't freeze!

Delivers all chemical process and industrial gases exactly as received. No liquid to evaporate and adulterate the gas. No dehumidification is necessary!

Absolutely safe storage at pressures up to 20" of water!

FIND OUT ABOUT THE GREATER SAFETY, GREATER ECONOMY, GREATER VERSATILITY OF THE WIGGINS GASHOLDER NOW!

MAIL THIS COUPON

General American Transportation Corporation
Dept. CI 12, Chicago 90, Illinois

☐ Send your latest bulletin on the Wiggins Gasholder.

☐ Ask your representative to get in touch with me so that I can learn how the Wiggins Gasholder can fit into our operations.

Name_____

Title or function_____

Company_____

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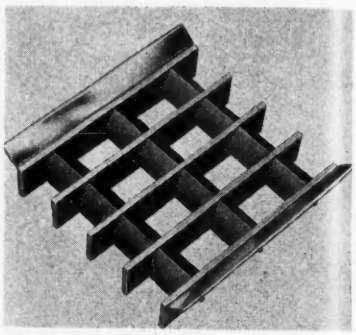
trol, the new units will maintain moisture uniformity.

Available in three sizes, the new Paasche units will diffuse up to one, two and three gallons of water or other liquid per hour, respectively. These capacities are claimed to be sufficient to control the humidity within 2% fluctuation in areas of 15,000, 30,000 or 45,000 cubic feet of space. The required air pressure is six cubic feet per minute at 40 pounds.

• A new *permanent magnetic separator* is being manufactured by The Bauer Bros. Co., 1727 Sheridan Ave., Springfield, Ohio. It is in the form of a grate with magnetized Alnico bars and iron



spacers. The angular side supports are so designed that the grate can be laid in the bottom of a hopper or a floor opening, being readily lifted out for cleaning. Not shown in the illustration is a wire grid which overhangs the grate. The rods are spaced midway between the magnetic bars to deflect the material and cause the streams to wipe the bars. In addition to attracting ferrous pieces and particles, the grate catches sticks, straws, paper, cloth, strings, stones, etc. The magnetic grates are made to fit all sizes of openings upwards from 8" square.

• Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill., announces the development and manufacture of a new *screen*—the Link-Belt Thru-Clean Bar Screen—for efficiently removing trash and large solids from water and sewage at water, sewage and industrial waste treatment plants.

The primary elements of the Thru-Clean Screen are a permanently supported rack of vertical steel screen bars and a power operated screen-bar-cleaning mechanism employing two endless parallel-strands of "C" Class Combination chain between which are fastened two or more steel rakes at evenly spaced intervals.

The rake teeth engage the screen bars through the screen rack from the downstream side, and are moved upwards through the screen bars to the discharge point—where the screenings are discharged by a pivoted, counter-weighted mechanical wiper plate.

The machine is operated by a Gearmotor and encased "RC" roller chain

(*Turn to page 986*)

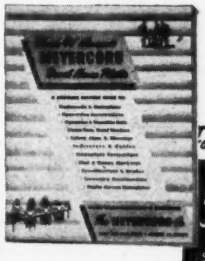
RETURNABLE CONTAINER USERS!

MEYERCORD DECAL NAMEPLATES

ELIMINATE DANGER
MIS-SHIPMENT
CONTAINER LOSS

Safe, sure, durable identification

From carboys to tank cars, there's a Meyercord Decal nameplate to do a lasting, low-cost identification job. Any colors, size or designs can be produced for fast, easy application on metal, glass, wood, or composition surfaces . . . curved or flat. Special Decals designed for unusual materials and conditions.



FREE!

Send for this new name plate brochure. It tells where and how to use Decals. Write Dept. CI-12

Founder-Member Lithographic Technical Foundation

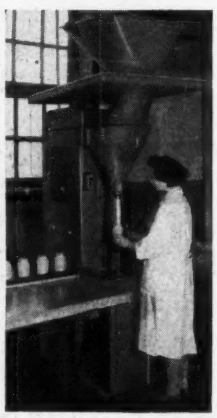
The MEYERCORD Co.
World's Largest Decal Manufacturer
5323 W. LAKE ST. CHICAGO 44 ILL.

IDENTIFY • ADVERTISE • DECORATE •

Let Modern Triangle Machinery Reduce Your Packaging Costs 25% or More!

• IN many plants one of the greatest opportunities for reducing costs and protecting profits lies in the packaging department. New developments in Triangle Package machinery make it possible for plants packaging dry materials to save labor, minimize waste and breakage and turn out better looking packages faster in less space . . . with savings of 25% and more.

• FOR EXAMPLE: The Triangle Model U-1 powder packer has been redesigned to help you cut costs. One operator can handle 18 to 30 packages per minute, 1 oz. to 5 lbs. As soon as the operator places the container in position, filling starts automatically. No spillage, no waste. Powder is packed uniformly and tightly, permitting use of smaller, less expensive containers. Handles hundreds of products . . . quickly changed over . . . easy to clean . . . minimum floor space and low in first cost! This is one of many Triangle automatic and semi-automatic machines to reduce the cost of packaging dry materials.



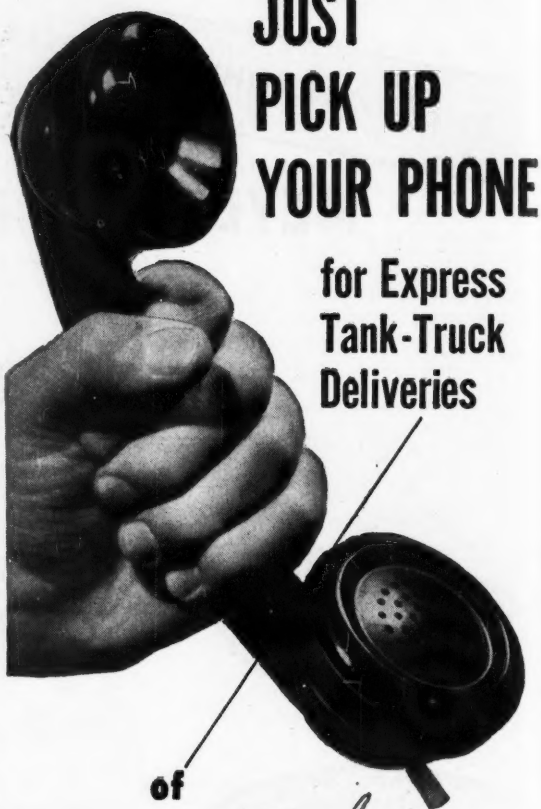
• For complete data, send a sample filled package to Triangle and state production required . . . no obligation.

Ask about the Triangle Pay-As-You-Package Plan

TRIANGLE PACKAGE MACHINERY CO.

6655 W. DIVERSEY BLVD., CHICAGO 35, ILL.

Sales Offices: San Francisco, Denver, Dallas, Atlanta, New York, Pittsburgh, Boston, Jacksonville. *Branch Factory:* Los Angeles.



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Xylol Hi-Flash solvent
Methanol

If your plant is located within 60 miles of the important industrial centers listed below, Barrett is organized to deliver supplies of Benzol and other coal-tar solvents by express tank-truck deliveries direct to your own storage tanks.

Barrett* aromatic solvents and diluents possess a high degree of reliability. This is maintained by carefully standardizing specifications, manufacturing operations and testing methods.

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Cleveland	Cherry 5943	New York	Whitehall 4-0800
Detroit	Vinewood 2-2500	Philadelphia	Jefferson 3-3000
		St. Louis	Lockhart 6510

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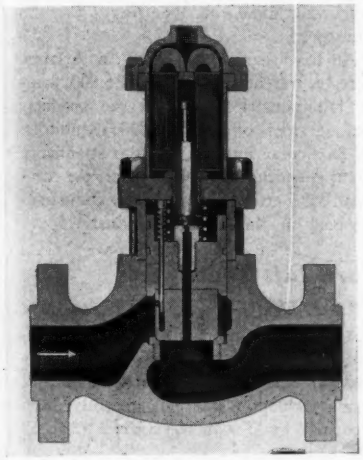
drive connecting with its head shaft. The operation may be automatic by means of a time clock, or manually by push buttons.

• A new line of *buffer solutions* for calibrating any pH instrument is available from Leeds & Northrup Co., 4934 Stenton Ave., Phila. 44, Pa. Nominal pH values are 4, 7, and 9; actual, 4.01, 6.86, and 9.16 at 25° C. Solutions are supplied in 1 pt. unbreakable non-contaminating, re-usable polyethylene bottles on which are printed pH-temperature calibrations from 0-60° C. Buffers are made, and checked after bottling, to National Bureau of Standards specifications.

• The cross-section view of this *solenoid-operated valve,* a product of Hoppe Engineering Co., Greensboro, Ind., shows a forged steel body with the disc and seat made of wear resisting exelloy. The valve is rugged and durable and has been



carefully designed to assure maximum strength and long life. The valve is suitable for oil or oil vapor service on temperatures up to 1,000° F., and for steam, water, oil, gas and general service on temperatures up to 850° F. The valve is packless and has only three moving parts, operates from a 6 volt storage battery.

The forged steel valves are made in sizes from ½ to 2" screwed or flanged; corrosion resistant solenoid valves, from ¼ to 3" inclusive.

• The Consolidated Engineering Corp., 620 N. Lake Ave., Pasadena 4, Calif., has developed and is now manufacturing a new instrument known as the Model 26-102 Titrilog. This is a highly sensitive and stable instrument for the automatic and continuous *recording of concentrations of oxidizable sulphur compounds,* such as SO_2, H_2S, mercaptans, thioethers, and disulfides in monitoring or control problems on gas streams or atmosphere. Sensitivity of the instrument is such that concentrations as low as 0.1 ppm or 0.005 grains per 100 ft.³ are recorded yet its features include adjust-

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Remember these facts about our Stocks and Services in

BECKMAN pH METERS

1. We are one of the oldest, largest and most experienced dealers in famous Beckman instruments for pH measurement. We carry complete stocks of meters, repair parts, electrodes and other accessories.

2. Our deliveries are prompt—not only on new Beckman instruments you purchase, but on those you send to us for overhaul or repairs. Most important, our service personnel is experienced. All work is guaranteed. Charges are reasonable.

3. There is a need in almost every industry for pH measurements. A Beckman instrument does the job right! And our technical staff knows the *right* Beckman model for each job! May we serve you?

9681 — BECKMAN pH METER, MODEL H-2, ideal for process control. Range 0 to 14 pH. Direct readings with accuracy of ±0.03 pH!

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PACKAGING & SHIPPING

by T. PAT CALLAHAN

"Warning Labels" Manual New Edition

The Manufacturing Chemists' Association has issued a completely rewritten and revised edition of its manual, "Warning Labels." Originally published in 1945, the manual has been broadened in scope by the addition of new information and has been rearranged into convenient 6" x 9" size, loose leaf, with flexible plastic binding, and comprises 86 pages.

Intended as a guide for the preparation of warning labels for hazardous chemicals, the manual is divided into three parts as follows:

1. General principles involved in the design and preparation of warning labels for hazardous chemicals.
2. 180 illustrative warning labels for industrial chemicals.
3. 58 illustrative warning labels for economic poisons.

Included are principles for labeling small commercial packages and products intended for investigational use; container handling and storage instructions; definitions of pertinent terms, including a quantitative definition of the term "poison," related to exposure by contact, inhalation or oral intake; and a table outlining statements of hazard, precautionary measures and instructions in case of contact or exposure, based on the class of hazard encountered.

Principles contained in the manual have served as a basis for labeling requirements issued by several states and territories. The manual is intended to facilitate an effective, uniform pattern of chemical labeling throughout the nation, and to protect the ultimate consumer in the handling and use of chemicals.

Copies may be obtained from the Manufacturing Chemists' Association, 246 Woodward Building, Washington 5, D. C., at $1.00 each. Remittances should accompany orders.

Coughlin Heads PMMI

The Packaging Machinery Manufacturers' Institute elected Wallace E. Coughlin, vice-president, Pneumatic Scale Corp., Ltd., North Quincy, Mass., as its president at its Seventeenth Annual Meeting at the Edgewater Beach Hotel, Chicago, October 31-November 2, 1949. Nearly one hundred executives of packaging machinery companies attended the three day meeting of the Institute, which included two full day business sessions.

Two meetings were announced for 1950: the semi-annual meeting, to be held on April 24th at the Sheraton Hotel, Chicago, and the 18th annual meeting which will be held at the Homestead, Hot Springs, Virginia, Sept. 23-26, 1950.

Safety Devices in Valves For H_2S Cylinders

As a result of investigation by the Compressed Gas Association, the Association submits the following recommendation to all owners of hydrogen sulfide cylinders: "The safety devices used for hydrogen sulfide shall be an integral part of the valve or so installed that it can only be removed by use of special tools."

This is to prevent recurrence of an accident that resulted in two deaths when the fused safety plug on a cylinder of hydrogen sulfide was broken by a man who thought he was opening the valve.

Tips on Package Sealing

The Gummed Industries Association, Inc., 19 West 44th Street, New York 18, New York, has published a 24-page instruction manual, "What Every Shipper Should Know About Proper Package Sealing," and also a large wall chart illustrating the "Eight Steps to Perfect Closure."

This printed material, purely educational in nature, is available in reasonable quantity to all interested shippers without cost or obligation. Chemical shippers who use corrugated or fibre containers can avail themselves of these two important aids to proper sealing by contacting the Gummed Industries Association, Inc.

More information along the same line is available from the Fibre Box Association, 224 South Michigan Avenue, Chicago 4, Illinois, which has published a fibre box poster titled "Rules and Regulations and Methods on Sealing Fibre Boxes." This poster describes closing by adhesives, metal straps, gummed tape or by stitching or stapling. All this information on the proper closing of fibre boxes can be very helpful and it is suggested that all interested shippers of fibre boxes avail themselves of this very worth while information.

Packaging Exposition Set For April

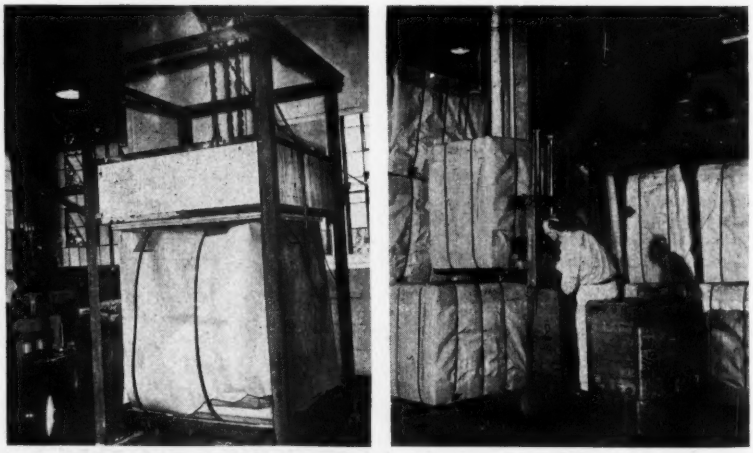
The 19th National Packaging Exposition of the American Management Association will be held from April 24 to April 27, 1950, at the Navy Pier in Chicago.

At this year's Exposition in Atlantic City, representatives of over 5,000 firms in 400 industries explored the products and services offered by 200 exhibitors. Of particular interest was the attendance from chemical companies. Six per cent of all who attended were from companies engaged in the chemical industry.

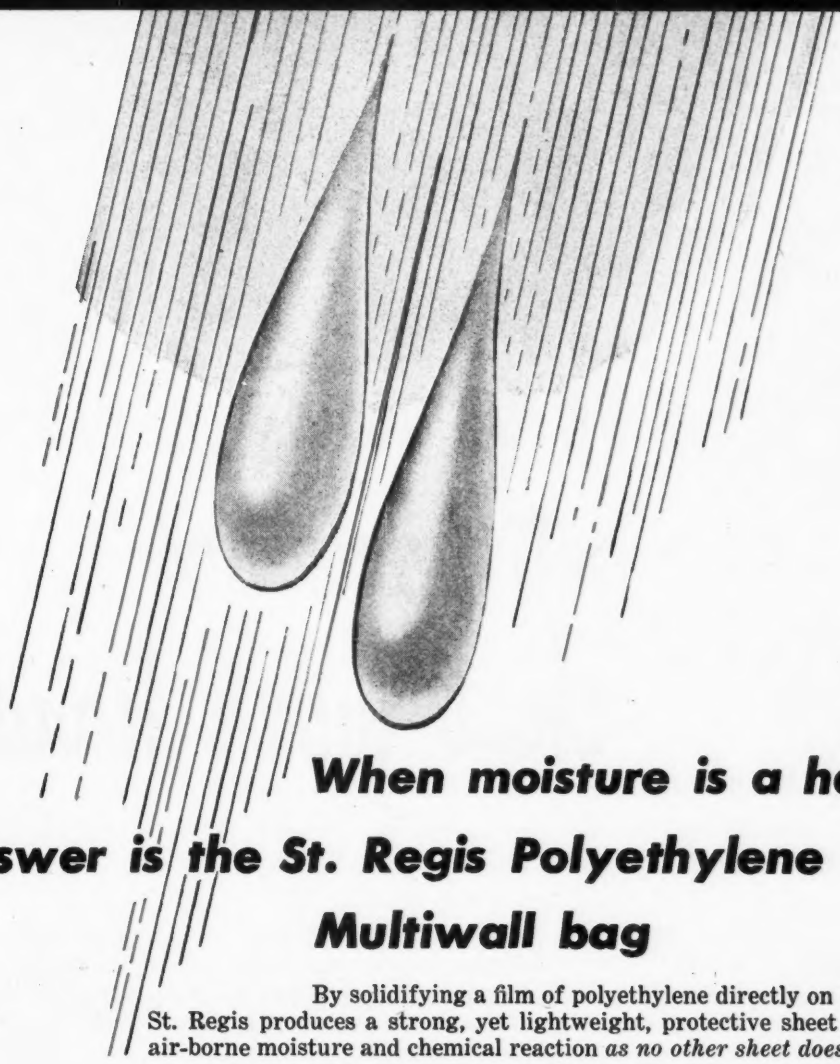
Fork Lift Truck Acts As Elevator

A new "Elevator" fork lift truck engineered to lower and raise heavy loads between balcony storage areas and first floor production line has recently been produced by Towmotor Corp., 1226 E.

Palletized Multiwall Bags



Multiwall paper bags arranged in large bundles on expendable pallets can be handled easily by lift trucks without waste of manpower previously common in handling unpalletized bags. Space-consuming conventional pallets are eliminated, and there is no danger of pallets collapsing. Pallet loaded with multiwall bags is placed in compressor unit for final wrapping and steel strapping at the plant of Arkell and Smiths (left). A St. Regis Unit Load is being stacked by fork truck in that company's plant (right).



When moisture is a hazard...

the answer is the St. Regis Polyethylene Multiwall bag

By solidifying a film of polyethylene directly on kraft paper, St. Regis produces a strong, yet lightweight, protective sheet that resists air-borne moisture and chemical reaction *as no other sheet does.*

It is also more acid resistant, more alkali resistant and more grease proof; it does not bleed at higher packing temperatures nor crack, even at very low temperatures. It has greater strength, is non-toxic, tasteless and odorless.

Used as a ply in the Multiwall, this sheet affords superior protection to chemicals, food products, hygroscopic materials of all kinds. That's why manufacturers are now using St. Regis Polyethylene Multiwalls for such items as:

- Asphalt Sealing Compounds
- Beta Naphthol
- Brown Sugar
- Calcium Chloride
- Cellulose Acetate
- Compost
- Detergents
- Meat Trimmings
- Mono Sodium Phosphate
- Polyethylene
- Powdered Milk
- Quick Lime
- Urea Resin

For full details about this remarkable packaging development, consult your nearest St. Regis Sales Office.

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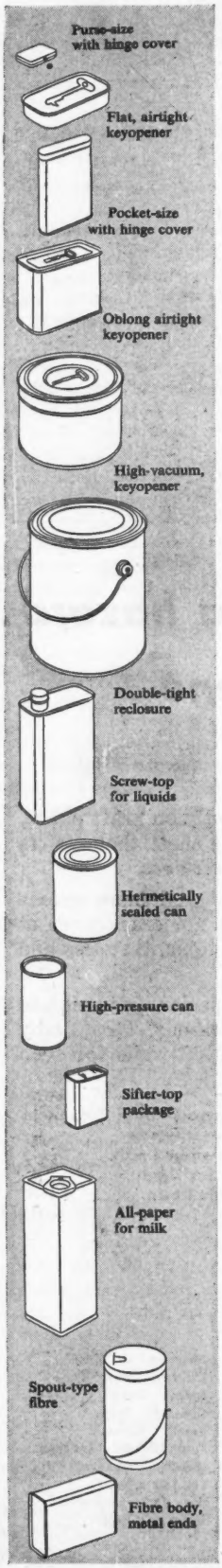
YOU BUY PROTECTION WHEN YOU BUY MULTIWALLS

WHICH PACKAGE SUITS YOUR PRODUCT?



Why not get packages that work harder?

Faced with tougher going in today's buyer's market, progressive management men are applying new techniques and principles to the sales force, the dealer set-up, the product, and *to the package in which it reaches the ultimate consumer.*

CONSULT US

May we help make your package "more effective"? Since 1901, Canco has been out front in creating new and more effective packages. There is hardly a major development in metal and fibre packaging—whether it be for a food or non-food product—that this keen, alert organization has not pioneered.

Canco can help you with cost-cutting, sales-building advice on packages, processes, filling and closing. Canco stands ready to serve you promptly in production-line emergencies. From Canco you get as many containers as you need when you need them. Let's get together!

CALL CANCO FIRST

AMERICAN CAN COMPANY

New York • Chicago • San Francisco

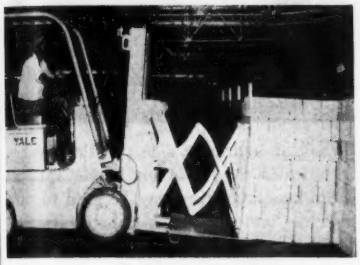
152nd St., Cleveland, Ohio. It is believed to be one of the first developments of its kind.

A special non-tilt mast and carriage assembly were designed to permit the load carrying forks to be lowered 98 inches below balcony floor level. Mounted on a standard Towmotor fork lift truck, the elevator unit has a lifting and lowering capacity of 2,000 lbs. Full capacity loads can be lifted from first floor to 10 inches above balcony floor level.

The "Elevator" truck can be built in various capacities and heights-of-lift.

Pallets Eliminated in New Loading System

Boxes, barrels, bales, drums, and cartons can now be handled in multiple units, without the use of pallets, by the appli-



cation of the new Pak-Loader fork truck system of the Yale & Towne Manufacturing Co., Roosevelt Blvd. & Haldeman Ave., Philadelphia. It is most advantageous: (1) where large quantities of goods are stored, and (2) when goods are customarily shipped unpalletized.

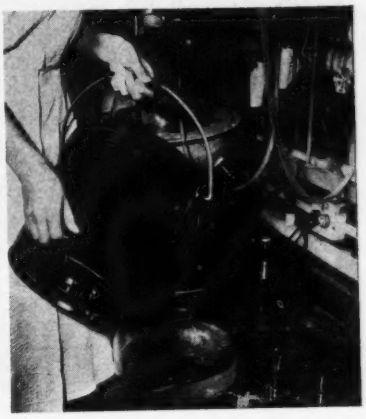
The system eliminates handling operations and saves work-hours when pallets are not to be shipped with the load, as loads comprising many individual containers are pushed into position on freight cars or highway trucks in one operation, whereas pallets would have to be unloaded one container at a time.

The system comprises two components, namely fork trucks equipped with pusher mechanisms and two or three specially adapted steel plates per fork truck.

The steel plates are cut to the size which best fits the specific load to be handled. Legs about four inches high are secured to one end of the plate. When loading the plate, a block of wood is placed under the toe to keep it level. The forks of the truck slip under the plate for lifting. When unloading, the forks are tilted forward to rest the front end of the loaded plate next to the pile of goods already stored. As the pusher is extended, the truck moves backward. A locking device holds the steel plate on the forks and prevents it from being pushed off with the load. The plate is returned for reloading when the truck picks up another load. While the truck is taking a load to storage, or from storage to shipping, another plate is being loaded in readiness for the truck's return.

Safe Pail for Handling Acids, Alkalis

A new molded pail that has been designed for safety as well as economical use in handling acid and alkaline chem-



icals, is being manufactured by Stokes Molded Products, Inc., Trenton, N. J. The new container is fabricated from a virgin rubber base compound. Other outstanding features are the pouring lip and the molded tipper on the bottom of

DON'T THROW YOUR MONEY DOWN THIS WELL

Potdevin Labelers are a **one time** investment that will save you time every day, money every pay day. Initial price is low—installation costs nothing—any worker can operate a Potdevin. With daily cleaning and weekly lubrication your Potdevin lasts a lifetime.

And while you're writing for a Labeler—on 10 days free trial—consider a Potdevin Carton Gluer to speed up shipping operations. It's power driven—puts glue on carton flaps as fast as your men can handle them. Saves adhesives by controlling the glue film—applying it only where it's needed.

POTDEVIN

POTDEVIN

MACHINE CO.

1282—38th Street Brooklyn 18, N.Y.

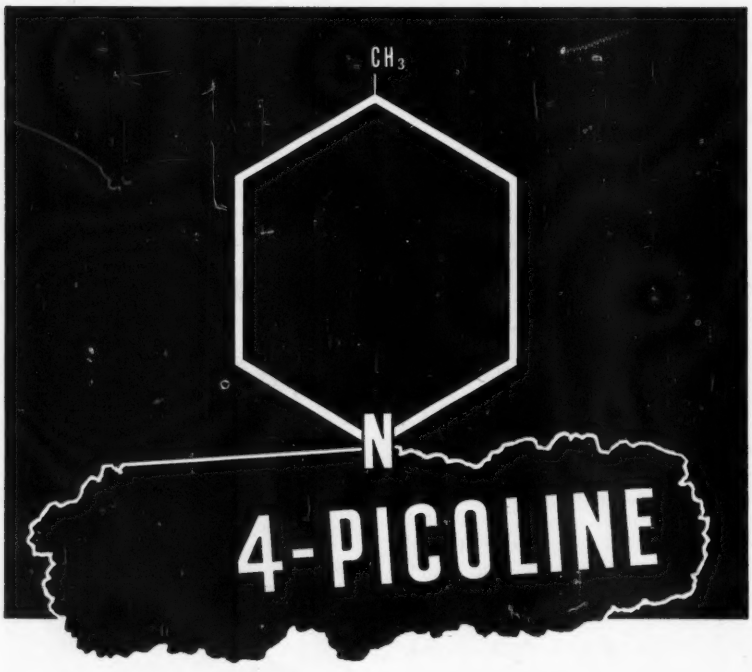
Please send me a Potdevin Labeler on 10 days free trial—and details on Potdevin Carton Gluers.

Name and Title .....

Company .....

Street .....

City ..... Zone ..... State .....



An Alkylpyridine With Many Interesting Properties

● Recent studies indicate that pyridine compounds having an alkyl group in the 4-position possess superior activities as medicinals, fungicides and insecticides.

One of these compounds, Reilly 4-Picoline, is readily oxidized, condenses freely with aldehydes, and forms quaternary salts with remarkable ease.

Research laboratories interested in the development of new pharmaceuticals, insecticides, anti-oxidants and rubber chemicals will find it well worth their while to investigate Reilly 4-Picoline.

Other Reilly Alkylpyridines are 2-Picoline, 3-Picoline, 2,6-Lutidine, 2,4-Lutidine, 2,4,6-Collidine, 2-Methyl-5-Ethylpyridine, 2-Amylpyridine, 4-Amylpyridine, 2-(5-Nonyl) pyridine, and 4-(5-Nonyl) pyridine.

Your inquiries on any of these compounds will have prompt attention.

Reilly Coal Tar Chemicals For Industry

REILLY TAR & CHEMICAL CORPORATION

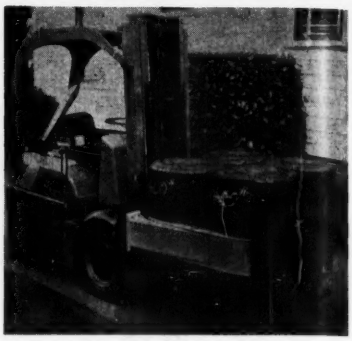
Merchants Bank Bldg., Indianapolis 4, Ind.

500 Fifth Avenue, New York 18 • 2513 S. Damen Avenue, Chicago 8

the pail which provides a firm hold for accurate control.

Four-Drum Handling Arms

From one to four drums or barrels of material may be safely and efficiently handled at the same time without the need of pallets with the new four-drum handling arms available for the Hyster Load-Grab attachment mounted on the "40" lift truck. Drums may be lifted in either horizontal or vertical position by



means of hydraulic side pressure. When installed on the Revolving Load-Grab, the drum-handling arms may be used to turn over or dump drums or barrels. Rubber-faced gripping surfaces on the arms prevent scratching.

Capacity of the drum-handling arms rated at 23" load centers is 2,800 pounds with the regular Load-Grab and 2,380 pounds with the Revolving Load-Grab. Variances up to 1½ inches in drum diameters are automatically compensated for in handling. Hyster Co., 2902 N. E. Clackamas St., Portland, Ore., is the manufacturer.

Packaging Institute Elects

The Packaging Institute at the eleventh annual forum held recently, elected the following officers for 1949-1950; president, Charles L. Barr; vice-president, Charles O. Kendall; vice-president, Henry W. Stevens; executive director, Laurence V. Burton.

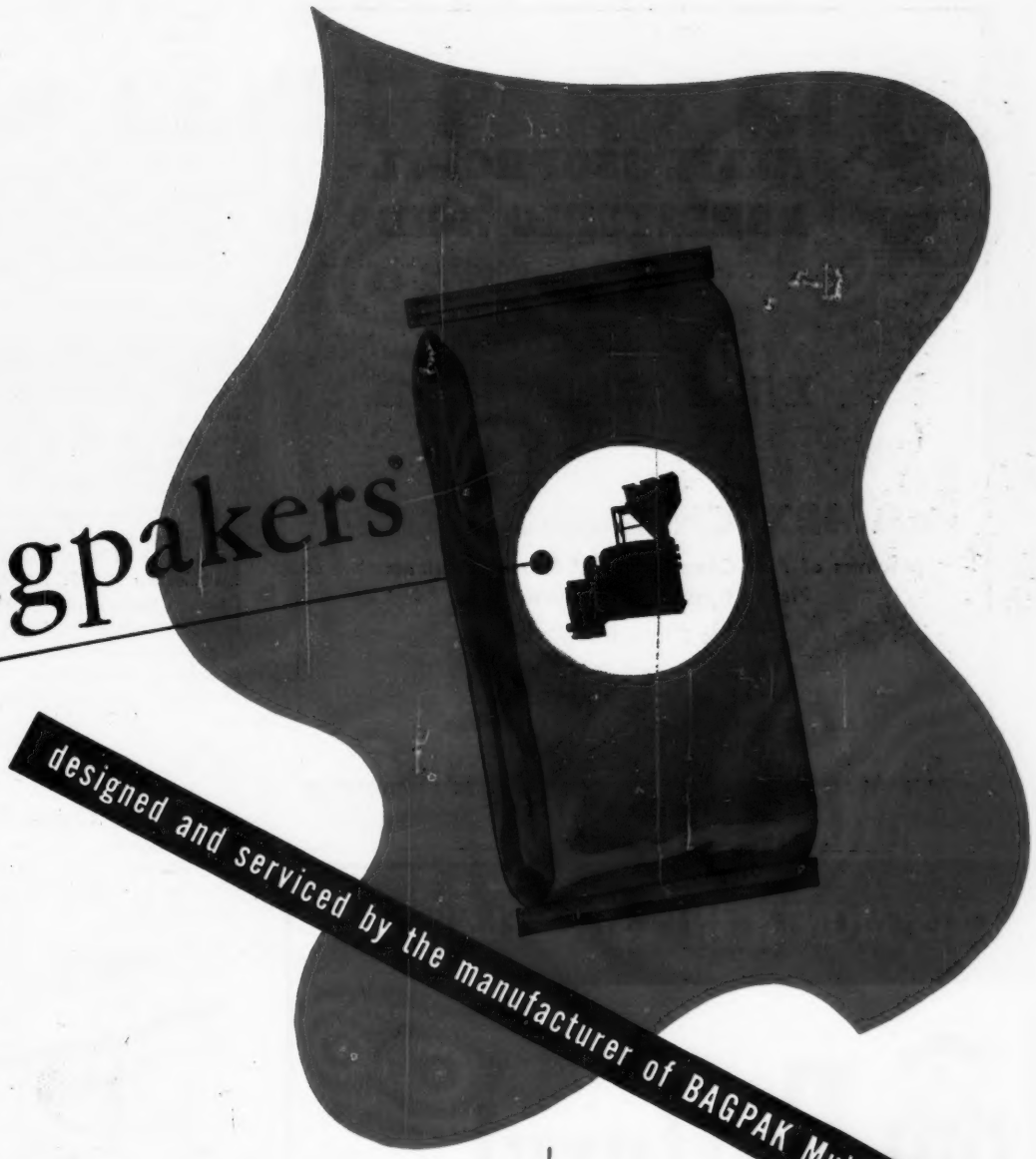
Additional Amendments To ICC Regulations

In addition to the changes listed in the Packaging & Shipping section of the November issue, the Interstate Commerce Commission Rules and Regulations were amended on Sept. 21, 1949, as follows:

Section 73.303 (q) (1), formerly section 303 (q) (1), has been amended to include specification tank car ICC-105A300 with a maximum permitted filling density of 110 percent for the shipment of monochlorodifluoromethane.

Section 73.361, formerly section 361 paragraph (g) has been amended by adding (g) (2) as follows:

(g) (2) Spec. 12B. Fiberboard boxes with securely closed inside fiber-



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board or chipboard boxes not over 6 pounds net weight each. Interior containers must be at least .028 inches thick for those not over 2½ pounds net weight each and at least .034 inches thick for others. Outside packages must contain not over 36 pounds net weight of material each.

TEST. The individual interior containers as well as the completed package prepared as for shipping must be capable of standing a drop of 4 feet to solid concrete without breakage of the container or any sifting of contents.

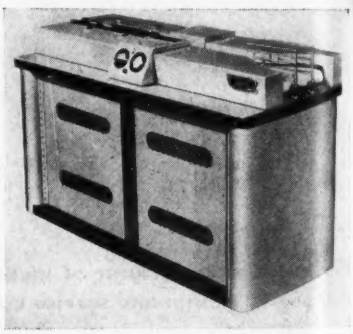
The purpose of this amendment is to provide for an additional container for the shipment of certain poisonous solids.

The specifications for the construction of ICC Specification 1A carboys have been amended by inclusion of laminated wood as a material for the manufacture of boxes under this specification.

ICC Specification 5C has been amended in order to clarify the types of stainless steel authorized for various strengths of nitric acid. The complete revision of Specification ICC 5C is not quoted here; however, the new revision as promulgated by the Commission should be consulted if a shipper intends to use stainless steel drums for shipment of nitric acid. Of particular importance to the chemical industry in this revision is the inclusion of the new 15-gallon bilge-type stainless steel drum for shipping nitric acid.

Automatic Check-Weigher

The Selectrol, an automatic, electronically-operated check-weigher manufactured by The Exact Weight Scale Co., Columbus, Ohio, is finding wide application in the chemical field. Available in a wide variety of capacities ranging from a few ounces to several pounds, some can weigh up to 125 units per minute under certain conditions. Every article passing over the Selectrol's weighing member, is automatically separated into three classifications—underweight, exact weight, and overweight.



New MCA Manual

The Manufacturing Chemists' Association has published Chemical Safety Data Sheet SD-34 on Tetrachloroethane. Designed for supervisory staffs and management, it may be obtained at 20 cents per copy from the MCA.

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PLANT OPERATIONS NOTEBOOK

NOMOGRAPH-OF-THE-MONTH

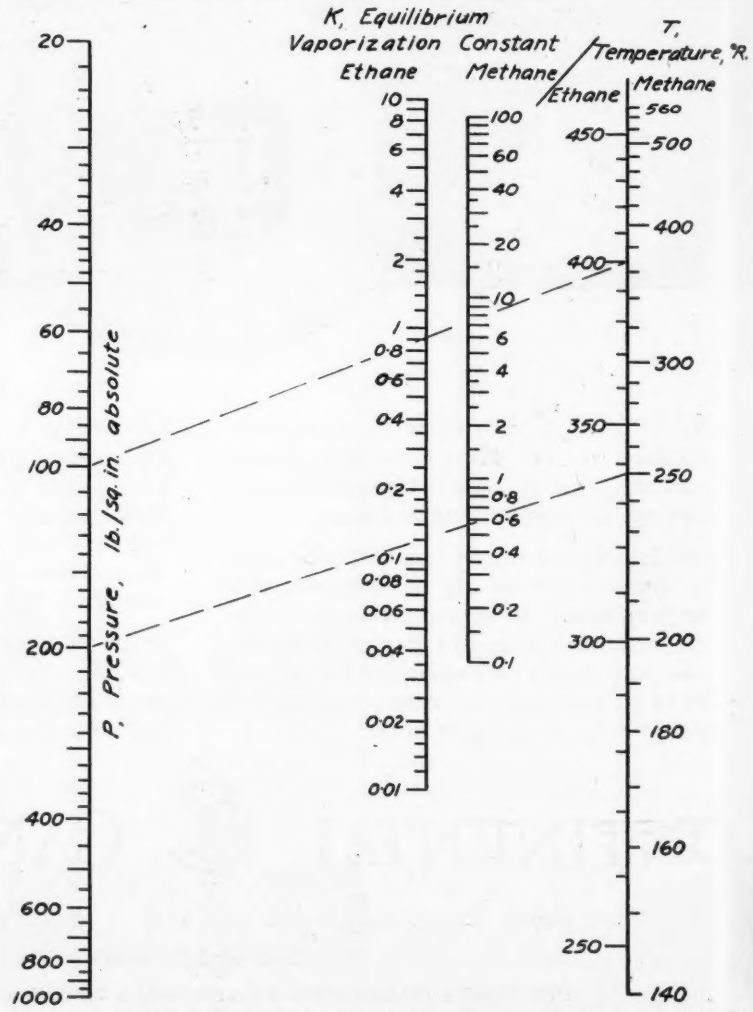
Edited by DALE S. DAVIS

Readers are invited to submit for publication in this department any original nomographs pertaining to chemistry or engineering. $10 will be paid for each one used.

Equilibrium Vaporization Constants for Natural Gas Hydrocarbons and Hydrogen

by R. C. SCOTT, JR.
Lynchburg, Virginia

THE accompanying nomograph, based on the Brown and Stutzman equations (1), was developed as a means of estimating the equilibrium vaporization constants of ethane and methane. As mentioned by these authors, experimental data used in the correlation for ethane were from systems with hydrogen, methane, ethylene, hydrogen and methane, methane and ethylene, and natural gas. The nomograph may be used directly for the methane-ethane system. For the ethane-ethylene system Brown and Stutzman state that a correction factor varying from 0.7 at 300° R. to 0.95 at 500° R. appears



Rapid esterification process with high yield utilizes . . .

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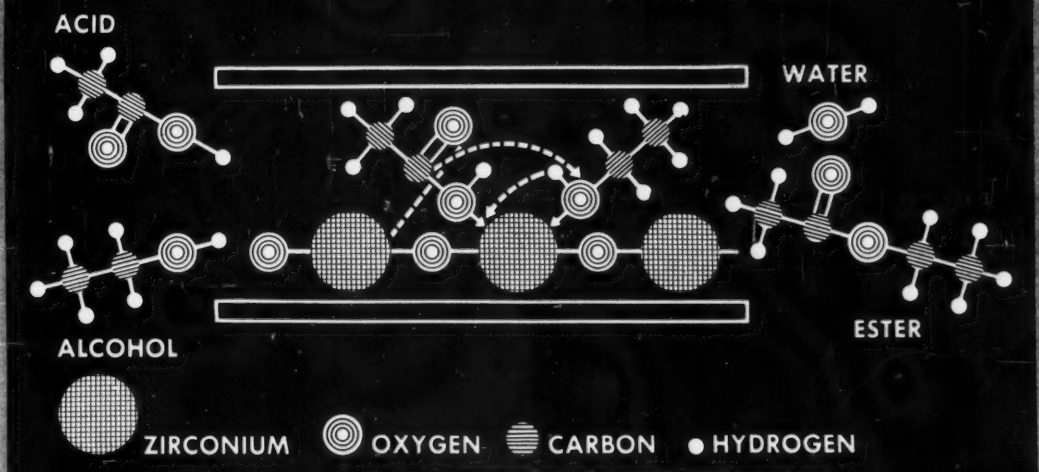

Research results show that Zirconia catalysts are effective in speeding many organic reactions. High yields of important commercial chemicals can be realized through their use. Zirconia is an extremely stable material and can be recovered quantitatively from a reactive system in which it is employed. It is non-toxic. In many ways, it is an ideal catalytic substance for processes yielding products that require high purity.

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THE ESTERIFICATION OF ORGANIC ACIDS WITH ALCOHOLS

THE PRODUCTION OF BUTADIENE

THE CRACKING OF HYDROCARBONS

THE CONDENSATION OF CERTAIN ORGANIC ACIDS

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The illustration shows a type SW EVACTOR using steam in the first stage and water in the second stage. Here the AQUA-VACTOR is used both as an ejector and as a condenser, handling air and, at the same time, condensing steam from the first stage. Of interest to engineers with corrosion problems, the steam stage in the illustration is constructed of carbon including the steam nozzle. The carbon is incased in case iron giving the equipment the strength of iron and the corrosion resistance of carbon.

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to be necessary whereas, for systems containing hydrogen, the factor appears to lie between 1.5 and 2.0.

Similarly, the experimental data they used in the correlation for methane were from systems with hydrogen, nitrogen, ethane, ethylene, hydrogen and ethane, ethane and ethylene, and natural gas. The nomograph may be used without correction for systems that consist largely of low molecular weight paraffin hydrocarbons and olefin hydrocarbons. For systems similar to the methane-hydrogen system, the calculated equilibrium constant should be increased by use of a factor of 1.1 to 1.2.

The nomograph is suitable for pressures up to 1000 pounds per square inch absolute or to one-fifth of the convergence pressure, whichever is lower. The chart is based on the relationships (1):

$$\log \frac{K\,P}{1 + 0.008(P/100)^{1.7}} = 5.0400 - \frac{1235}{T} \quad \text{for ethane}$$

and

$$\log \frac{K\,P}{1 + 0.008(P/100)^{1.7}} = 4.6100 - \frac{640.0}{T} \quad \text{for methane}$$

where

K = equilibrium vaporization constant for ethane (or methane) $= \frac{y}{x}$

x = mole fraction of component in question in liquid

y = mole fraction of component in question in vapor

P = pressure, pounds per square inch, absolute

and T = temperature, °R

The use of the chart, constructed by methods (2) described previously, is illustrated as follows: What is the equilibrium vaporization constant for ethane at a pressure of 100 pounds per square inch absolute and at a temperature of 400° Rankine? Connect 100 on the P scale with 400 on the ethane side of the T scale and read the equilibrium vaporization constant as 0.93. Also, what is the equilibrium vaporization constant for methane at a pressure of 200 pounds per square inch absolute and at a temperature of 250° Rankine? Connect 200 on the P scale with 250 on the methane side of the T scale and read the equilibrium vaporization constant as 0.57.

Literature Cited

(1) Brown, G. M. and Stutzman, L. F., Chemical Engineering Progress, *45* (2) 142-147 (1949).

(2) Davis, D. S., "Empirical Equations and Nomography," Chap. V, New York, McGraw-Hill Book Co., 1943.

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AMIDATION	•	$CNCH_2COOH + HNRR^1$	$\rightarrow CNCH_2CONRR^1 + H_2O$
CHLORINATION	•	$CNCH_2COOH + PCl_3 + Cl$	$\rightarrow CNCH_2COCl + POCl_3 + HCl$
HYDROLYSIS	•	$CNCH_2COOH + H_2O$	$\rightarrow CH_2(COOH)_2 + NH_3$
REDUCTION	•	$CNCH_2COOH + 2H_2$	$\rightarrow NH_2CH_2CH_2COOH$
CONDENSATION	•	$CNCH_2COOH + RCOR^1$	$\rightarrow RR^1 C = C(CN) COOH + H_2O$

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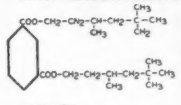
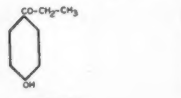
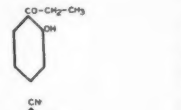


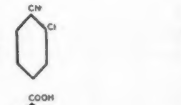
Di(3-5-5 Trimethyl Hexyl) iso Phthalate
Light yellow liquid
B.P. 217-218°C at 1mm



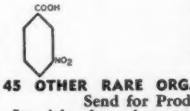
Parahydroxypropiophenone
Light yellow solid
M.P. 145-147°C



Orthohydroxypropiophenone
Light yellow liquid
B.P. 118-120°C (10 mm)



Orthochlorobenzonitrile
White solid
M.P. 42-43°C



Metanitrobenzoic Acid
White powder
M.P. 139-140°C

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LABORATORY NOTEBOOK

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2-Aminodicyclohexyl
1,2,3-Trichlorobenzene
1,3,3-Trimethyl-2-methyleneindoline
1-Methyl-2-methylene-1,2-dihydrobenzothiazole
1-Methyl-2-methylene-1,2-dihydroquinoline
Titanium tetraiodide
Potassium carbide
Sodium carbide
Antimony carbide
Lead carbide
Indoxylic acid
2,5-Dimercaptothiodiazole
p-Semicarbazidotoluene
Dimethyl-2,3,4-trichloroglutarate
Divarin
d-Laudanosine
Tin carbide
3-Methyl-3-amino-4-heptanol
Canadine
p-Thiocyanophenylhydrazine hydrochloride
Phrenosin
1-Thio-D-glucose
Isobutyl peroxide
Carnegine
Butyl fluoride
Shikimic acid
Senecioic acid
Apigenin
6-Ketoprogesterone
Naphthalene-1,6-disulfonic acid
2-Methyl-3-hydroxypropiophenone
2-Methyl-3-nitropropiophenone
2-Methyl-3-aminopropiophenone
Coniferyl aldehyde

Gas Analysis

Butyl rubber tubing yields more accurate results for gas analysis equipment than natural rubber.

Gas analysis equipment yields more accurate results when Butyl rubber tubing is used in place of silicone or natural rubber, because of its low permeability to air. Formerly obtainable only in large quantity lots, Butyl rubber tubing may now be purchased in quantities convenient for the laboratory from Fisher Scientific Co., 717 Forbes Street, Pittsburgh, Pa. Tubing comes in two diameters—¼" and 3/16", both with ⅛" wall thickness.

Recently published data (*Analytical Chemistry,* Nov. 1948 p. 1116) indicates that Butyl rubber tubing, used for connections in the Dumas apparatus for the determination of nitrogen, has about one-tenth the permeability to carbon dioxide as that of natural rubber.

Unlike certain plastic tubings, Butyl is soft and flexible, and therefore fits snugly over glass fittings. It is also highly resistant to oxidation.

• Amperex Electronic Corp., 25 Washington St., Brooklyn 1, N. Y., announces a new, thin metal wall *radiation counter tube,* Type 52N, for beta and gamma detection.

This self-quenching tube features extremely rugged mechanical construction, unlimited life, unchanging characteristics with use, low operating voltage and a long plateau.

The tube may be operated over a wide temperature range without affecting tube life or electrical characteristics. Accidental overvoltage will not harm this tube.

The *high consistency rotational viscometer* was developed by Precision Scientific Co., 3737 W. Cortland St., Chicago 47, Ill., in cooperation with The Texas Co. to measure the viscosity of asphalt and related viscous substances. It makes possible a complete evaluation of the high consistency materials having complex flow characteristics. When testing high consistency liquids, it will determine the viscosity, the degree of flow complexity and the relative elasticity.

The new viscometer measures and records viscosity from 0.001 to 1,000 megapoises at various rates of shear. The sample cup can be rotated at any one of ten speeds from 0.0696 to 2200 revolutions per hour and these speeds are in direct relation to the rate of shear.

• Incorporation of a synthetic wetting agent is said to improve greatly the usefulness of *laboratory Calgonite* for cleaning glassware, porcelain and other laboratory utensils. Laboratory Calgonite is sold by Fisher Scientific Co.—Eimer and Amend.

The wetting agent enhances the value of the compound by reducing surface tension, thereby permitting the washing solution to remove dirt more efficiently. The compound especially developed for laboratory use also contains "Calgon" which softens tap water to rain-water purity. It stops formation of "scum" by preventing combination of calcium and magnesium with soap to form insoluble salts. Improved Calgonite also is said to minimize the need for rinsing. Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Penna.

• The Barclay Instruments Division of The Patent Button Co., Waterbury, Conn., has introduced the Barclay *flame photometer* for rapid quantitative determination of sodium and potassium.

The Barclay flame photometer was developed with the close cooperation of scientists in leading medical research centers, and incorporates many features determined necessary for research and clinical use by scientists intimately familiar with flame photometry. The instrument is designed to provide maximum rapidity in making determinations with a high order of accuracy and reproducibility. The principle upon which the method depends is simple and direct. A straightforward D. C. Circuit is used in the instrument with a sensitive yet rugged portable-type galvanometer as an external null indicator.

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Nuclear Physics

INTRODUCTION TO RADIOCHEMISTRY, *by Gerhart Friedlander and Joseph Kennedy.* John Wiley & Sons, Inc., New York. 412 pp., including appendix and index. $5.00. Reviewed by W. I. Thompson, The H. K. Ferguson Company.

THE AUTHORS present this book as an introductory text for chemists with no previous knowledge of nuclear physics. The increase in use of radiochemical techniques has encouraged the writing of specialty books on the subject but few general texts such as this are available.

The first few chapters on nuclear physics and structure of nuclei may prove confusing since concepts such as spin, statistics, wave mechanics, etc., are casually introduced as though the methods of atomic spectra analysis were completely familiar. However, the wide coverage of subjects will be useful to a competent teacher in organizing a general course, and solution of the problems included will give the student a feeling of reality which is not gained by reading alone. Probably the experimental techniques should be discussed as soon as possible, concurrently with the general discussion of theory.

The tables of nuclear data and constants in the appendix make this book reasonably self-contained for the use of students. For those who would go further literature references are given after each chapter.

Colloid Text

A TEXTBOOK OF COLLOID CHEMISTRY *by Harry Boyer Weiser.* John Wiley & Sons, Inc., New York, 444 pp.; $5.50. Reviewed by Jerome Alexander, Consulting Chemist and Chemical Engineer, New York.

BACKED by Prof. Weiser's long experience as a teacher and investigator, this book carries out its triple objective: (1) to outline the foundations of colloid chemistry and the rôle of classical experiments in the development of modern theories and applications; (2) to formulate systematically and correlate critically the theories underlying colloid chemical behavior; and (3) to illustrate widely diversified applications of colloid chemistry.

Knowledge of the older basic work of scientific pioneers is not inherited, but must, as Prof. Weiser shows, be brought afresh to the developing mind of the student and not allowed to become obscured, buried and forgotten under the ever-increasing mass of addenda and newer nomenclature. This second edition, which continues to draw its form "from the incomparable *Kapillärchemie* of Herbert Freundlich", begins with an introductory 14-page chapter which is followed by six parts: (I) Adsorption, (II) Sols, (III) Gels, (IV) Emulsions and Foams, (V) Aerosols and Solid Solutions, and (VI) Applications of Colloid Chemical Principles to Contact Catalysis and Dyeing. Each chapter concludes with selected references, many being to well-documented books and articles.

Although the author has drawn largely on the work of many friends, including his mentor, that fine stalwart, Wilder D. Bancroft, the various topics are treated broadly, judiciously and judicially, so that the student is exposed to various and varied views, and has to work out concepts rather than swallow a prepared bolus. The following remarks of the *Advocatus Diaboli* are completely overshadowed by the value and usefulness of the book.

Few will agree (p. 153) that mechan-

menadione, u.s.p. xiii
oil soluble vitamin k useful in hemorrhagic diseases, diatheses due to low thrombin content.

digitoxin, u.s.p. xiii
in cardiac therapy.

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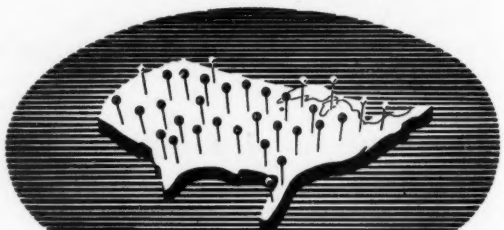

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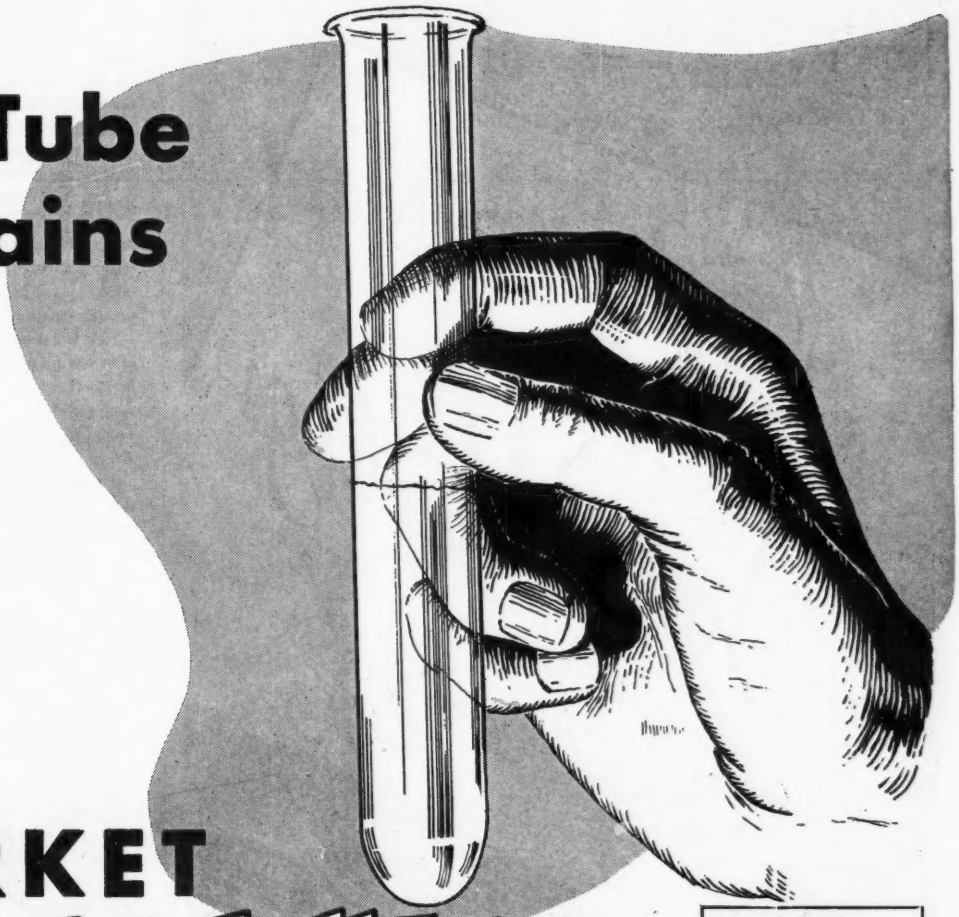

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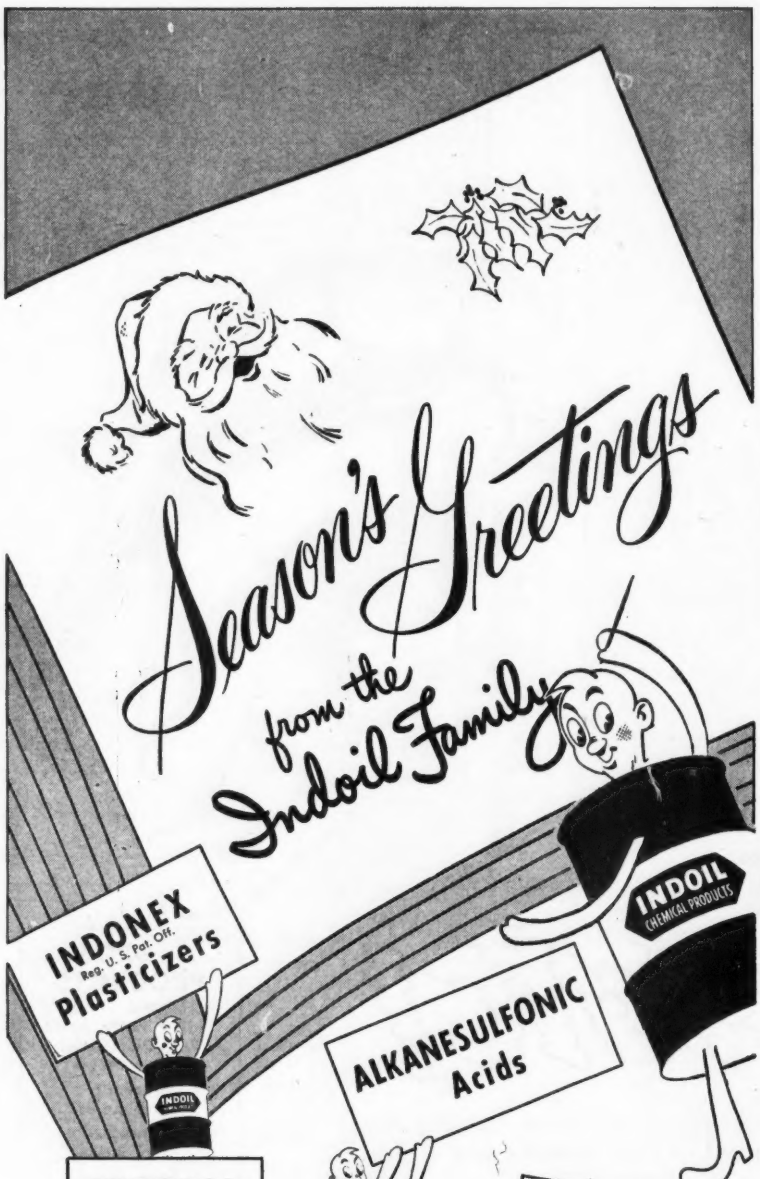

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ical and electrical disintegration are types of peptization; or that "protective colloids" should be called "protecting colloids". In carbon inks (p. 157) the Greeks were long anticipated by the Chinese and Egyptians. (Few people, even the Greeks, know how much technology and even art they took from Egypt, which, in turn, got much from the East.) The discussion of ultrafiltration omits Bechhold's important observation that deformable units may, under pressure, pass in filiform fashion through pores smaller than themselves—a fact which led some bacteriologists astray. The advance made by the ultramicroscope was in *visibility*, not *resolvability*, which latter was extended by the electron microscope (p. 172). The amount of light scattered by air or water molecules in the tiny volumes involved does not justify the assertion (p. 175) that "the ultramicroscope cannot be used as a means of proving the heterogeneity of a colloidal dispersion." The force of gravity is not increased by the ultracentrifuge (p. 197); sedimentation force is increased. With drilling muds (p. 320) specific gravity of the mix is important in preventing gas blowouts. The phenomena in concretions (e.g. gallstones) are insufficiently considered by simple reference to Liesegang rings, as H. Schade and L. Lichtwitz showed. "Blowing down" boilers removes not only suspended matter, but also much of the accumulated soluble salts. Reference should have been made here to the "metaphosphates", originally described by Graham in 1833, and now much used in boilers. Though the principles described in the book are important in biological and agricultural applications, few of these are discussed, probably for lack of space, despite what is said in the Preface and the dust cover.

The format, printing, and binding are excellent, and the book will have deserved success.

Other Publications

Government

MEDICAL X-RAY PROTECTION UP TO TWO MILLION VOLTS, NBS Handbook 41, 49 pp., 15¢ (20¢ foreign).

PROSPECTING FOR URANIUM is a joint effort of the AEC and the U. S. Geological Survey. 123 pp., 30¢ (25% discount on 100).

Films

INDUSTRIAL HEATING consists of a 25-minute black-and-white sound slidefilm and five different application data booklets for industrial education. The program kit, which includes the film and 50 copies of each of the 5 booklets, is available from General Electric Co. district offices for $15.

SOLIDS IN REFRIGERATION SYSTEMS is a 50-minute full-color film portraying the chemical and physical changes that cause trouble in refrigeration systems. Ansul Chemical Co., Marinette, Wis.

THE HIDDEN WORLD, 26 min., 16 mm., sound, color, is the story of engineering and equipment in modern industry. Allis-Chalmers Mfg. Co., Advertising & Industrial Press Dept., General Mach'y Div., Milwaukee 1, Wis.

WHITE MAGIC, 15 min., 16 mm., sound, color, is the story of gypsum. Two other films deal with lath and plaster and sheathing and wallboard. Gypsum Assn., 20 N. Wacker Drive, Chicago 6, Ill.

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Iodine Value (Wijs)	0.8
Neutralization Value	385.0
Color . . . Water White Odor . . . Characteristic	

Typical Composition

Caprylic Acid	90.0%
Caproic Acid	3.0%
Capric Acid	7.0%

Neo-Fat 9 (Capric Acid)

Mean Molecular Weight	173.3
Titer	30.0°C.
Iodine Value (Wijs)	1.2
Neutralization Value	323.7
Color . . . . . White Odor . . . . . Characteristic	

Typical Composition

Capric Acid	90.0%
Lauric Acid	7.0%
Caprylic Acid	3.0%

Neo-Fat 11 (Lauric Acid)

Mean Molecular Weight	203.0
Titer	37.8°C.
Iodine Value (Wijs)	1.0
Neutralization Value	276.0
Color . . . . . White Odor . . . . . Trace	

Typical Composition

Lauric Acid	90.0%
Myristic Acid	9.0%
Unsaturated Acids	1.0%
Capric Acid	trace

Neo-Fat 13 (Myristic Acid)

Mean Molecular Weight	226.0
Titer	37.8°C.
Iodine Value (Wijs)	2.0
Neutralization Value	248.0
Color . . . . . White Odor . . . . . Characteristic	

Typical Composition

Myristic Acid	90.0%
Lauric Acid	4.0%
Palmitic Acid	4.0%
Unsaturated Acids	2.0%

Neo-Fat 1-56 (Palmitic Acid)

Mean Molecular Weight	258.0
Titer	56.0°C.
Iodine Value (Wijs)	3.0
Neutralization Value	216.0
Color . . . . . White Odor . . . . . Trace	

Typical Composition

Palmitic Acid	90.0%
Oleic Acid	4.0%
Stearic Acid	6.0%

Neo-Fat 1-65 (Stearic Acid)

Mean Molecular Weight	282.5
Titer	67.0°C.
Iodine Value (Wijs)	3.0
Neutralization Value	198.0
Color . . . . . White Odor . . . . . Trace	

Typical Composition

Stearic Acid	90.0%
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Chemicals

Caustic Soda B840
Caustic soda safety and instruction chart contains suggestions for the protection of employees, precautions in unloading tank cars, how to handle frozen caustic in tank cars and general first aid information. 16½" by 23", Solvay Sales Division, Allied Chemical and Dye Corp.

Plasticizers B841
12-p. booklet describes 8 plasticizers. Specifications and properties included. Tennessee Eastman Corp.

Lactic Acid and Lactates B842
30-p. report gives details of the process of manufacturing plastic and U. S. P. grades of methyl lactate by fermentation of sugarcane molasses, at costs of approximately six cents per pound for methyl lactate, and below ten cents per pound for lactic acid. Analysis of markets for low-priced lactic acid included. R. S. Aries and Associates.

Resins, Protective Coating B843
Properties chart for protective coating resins list, the physical properties, viscosities in oil and toluol solubilities in solvents, compatabilities with wax and ethyl cellulose and suggested end uses. Available in two sizes, 20" by 31" for wall or 8½" by 11" for file folders. Also available, data sheets on Durez 220 and 220-V protective coating resins. 10 and 8 pp. respectively. Durez Plastics and Chemicals, Inc.

Wood Preservative B844
25-p. booklet discusses advantages of pentachlorophenol as a wood preservative. How it works and recommended methods of application are included. Monsanto Chemical Co.

Analyses and Tests B845
3 bulletins describe services available for analysis and testing of paint, varnish and plastic coatings; insecticides, fertilizers, weedicides; and food and feed products. Research and development services also listed. Raymond C. Crippen Research and Development Laboratories.

Wax and Wax Resin Emulsions B846
4-p. folder lists properties and applications and describes three stability classifications of Paracols, wax and wax resin emulsions. Hercules Powder Co.

Protective Coatings B847
Formulations for 12 types of protective coatings, including spar varnishes, aluminum vehicles, white enamels and lacquers. Technical Digest No. 19, The Baker Castor Oil Co.

Insecticide B848
5-p. reprint of an article entitled "A Preliminary Evaluation of the Insecticidal Effectiveness of the Completely Synthetic Allyl Homolog of Cinerin I." by R. B. Stoddard and W. E. Dove. U. S. Industrial Chemicals, Inc.

Chemicals B849
List of research chemicals produced for the first time, on a laboratory scale. City Chemical Corp.

Isopropenyl Acetate B850
4-p. bulletin describes properties and characteristic reactions of isopropenyl acetate. Tennessee Eastman Corp.

alpha-Methylstyrene B851
Technical data bulletin on availability, characteristics, physical properties, inhibitors, anti-oxidants, handling precautions, polymerization and copolymerization and uses for alpha methylstyrene by I. L. Amos, K. E. Coulter and F. Tennant. The Dow Chemical Co.

Oils and Resins B851a
4 specification charts on fish oils, soybean oils, glycerol phthalate resins and linseed oils. 4 pp. each. Falk and Co.

Styrene Latices B852
8-p. booklet describes physical characteristics of plasticized and unplasticized Lustrex styrene latice emulsions. Contains suggested procedures for compounding and handling. Monsanto Chemical Co.

meta-Benzenedisulfonic Acid B853
8-p. bulletin describes the physical and chemical properties of, and recommends uses for, meta-benzenedisulfonic acid. Bulletin C-9-53, Koppers Co., Inc.

Hexavalent Chromium Compounds B854
5-p. booklet on the properties, physical appearance, and structure of hexavalent chromium compounds. Bibliography included. Serial No. 56, Mutual Chemical Co. of America.

Emulsion Stabilizer B855
4-p. booklet describes characteristics and uses of TEAC-90, emulsion stabilizer, antioxidant and solubilizer. Technical Bulletin 5-49, Process Chemical Specialties.

Calcium Carbide B856
16-p. booklet traces the history of calcium carbide from the time of its discovery and discusses uses and potential uses. National Carbide Corp.

Cosmetic Raw Materials B857
8-p. booklet describes the chemical nature of a number of cosmetic raw materials and suggests applications. Van Dyk and Co.

para-Dichlorobenzene B858
12-p. booklet presents the recommended practices for control of agricultural and household pests with para-dichlorobenzene. Columbia Chemical Division, Pittsburgh Plate Glass Co.

Resins, Plastic B859
2 data sheets describe properties, preparation of, and uses of Elastomer 70, a polysulfide synthetic rubber and Elastomer 275, a vinyl chloride plastisol. Ernest F. Boruski, Jr.

Acrolein B860
4-p. folder describes physical properties and reactions of acrolein (acrylic aldehyde). Carbide and Carbon Chemicals Corp.

Soil Fumigant B861
8-p. bulletin describes Iscobrome, soil fumigant for the control of nematodes and soil insects, and gives instructions for its use. Innis, Speiden & Co.

Paints B862
5-p. article entitled "Laboratory Testing of Resistance of Traffic Paint to Bleeding," by Fred S. Byerly. U. S. Industrial Chemicals, Inc.

Equipment

Flotation Engineering J679
21-p. booklet discusses theory of flotation, and its application. Construction features and operating advantages of "Sub-A" flotation machines also described. Denver Equipment Co.

Engineered Equipment J680
8-p. booklet describes advantages of high alloy code pressure vessels, tanks, coils, fixtures and other fabricated equipment for the chemical and petroleum industry. Brown-Hutchinson Iron Works.

Polyethylene Film J681
Film conversion chart for the needle trade, bag converters, food packers, etc. Shows yield of flat film in square and lineal yards for the various widths and thicknesses. Durethene Corp.

Scale Models J682
8-p. bulletin describes uses and advantages of scale models for business and industry. Raymond A. Lester Associates.

Flowrator J683
4-p. bulletin describes and diagrams chemical feeder for liquids and gases. Catalog 62, Fischer and Porter Co.

Bags J684
16-p. booklet illustrates and describes briefly many types of bags and other products such as packers and twine. Bemis Bro. Bag Co.

Boiler Tubes and Pipe J685
Price sheets for minimum wall, seamless, carbon steel merchant boiler tubes in various sizes and plain end random length, seamless, carbon steel merchant pipe. Babcock and Wilcox Tube Co.

Cooling Tower Maintenance J686*
16-p. booklet contains suggestions for operation and maintenance of cooling towers. Gives procedure for putting tower into service, inspection, lubrication, checking efficiency, and partial or total shutdown. C. H. Wheeler Mfg. Co.

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Combustion Chambers and Burner Nozzles J687
Bulletin describes features, operation and capacities of graphite combustion chambers and graphite burner nozzle for the production of hydrogen chloride gas by burning hydrogen and chlorine. Catalog Section M-9602, National Carbon Co.

Pumps J688
8-p. describes and diagrams VMT pumps for handling liquids where net positive suction head is limited. Specifications included. Byron Jackson Co.

Pyrometer Indicator J689
4-p. bulletin describes multiple point pyrometer indicator. Dimensional drawings and prices included. Catalog Section 25, Thermo Electric Co.

Nitrogen Determinations J690
14-p. bulletin describes Hengar Kjeldahl apparatus for the quantitative determination of organic nitrogen by the Hengar technique. Hengar Co.

Floor Plate J691
7-p. bulletin gives applications, advantages, specifications and fabricating data on abrasive rolled steel floor plate. Alan Wood Steel Co.

Processing Equipment J692
12-p. booklet describes variety of production lines and automatic processing equipment and services of Continental Industrial Engineers, Inc. Booklet No. 127.

Water Conditioning Equipment J693
7-p. bulletin outlines products and services of the Graver Water Conditioning Co. Bulletin WC-100.

Laboratory Appliances J694
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Bulletin No. 44-949 describes and illustrates vertical drum truck. Morse Mfg. Co.

Gate Valves J697
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Furnaces, Electric J699
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Containers, Fireproof J700
2-p. bulletin describes how used drums may be converted into fireproof containers. The ProtectosealCo.

Centrifuges J701
23-p. booklet gives operating details, specifications, and application data for the complete line of supercentrifuges. Bulletin No. 1248, The Sharples Corp.

Pest Control Equipment J702
5-p. bulletin describes various kinds of equipment available from Pest Control Equipment Co.

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Bulletin 380 describes application of pressure gage snubber. The Parker Appliance Co.

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Radiation Pyrometer J705
Bulletin No. P1242 describes radiation pyrometer. Bristol Co.

Pumping J706
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Alloy Steel J707
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Wheel Casters J711
8-p. folder describes, diagrams, and gives specifications for "V" grooved wheel casters. The Bassick Co.

Reflectoscope J712
Bulletin 50-105 describes the Type UR reflectoscope, an ultrasonic instrument for locating defects in metals. 4-pp. Sperry Products, Inc.

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Chemical Processing Equipment J730
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Gages J731
12-p. catalog describes SR-4 bonded resistance wire strain gages. Table on electrical resistances, gage factors, dimensions and prices included. Baldwin Locomotive Works.

Thermowells J732
44-p. booklet gives specifications and diagrams for metal protecting wells for temperature indicating, recording and controlling instruments. Tables on chemical properties, physical and mechanical properties and material selection included. Catalog No. 200, Trinity Equipment Corp.

Electro-Chemograph J733
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Corrosion Resisting Alloys and Equipment J734
12-p. catalog condenses data published in 54 separate bulletins on corrosives resisting alloys and equipment. Covers features, capacities and sizes and available alloys for equipment, and composition and characteristics of alloys. Arranged alphabetically. General Catalog M, The Duriron Co.

Oscillographs J735
12-p. bulletin describes Types 304-H and 304 cathode ray oscillographs. Allen B. Du Mont Laboratories.

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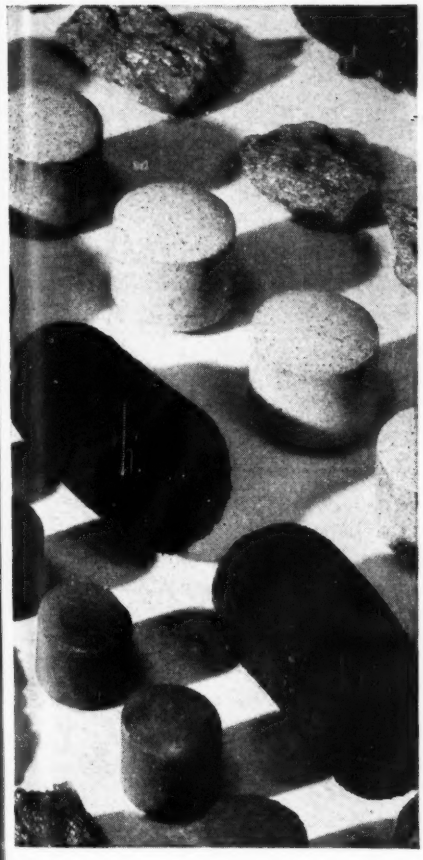

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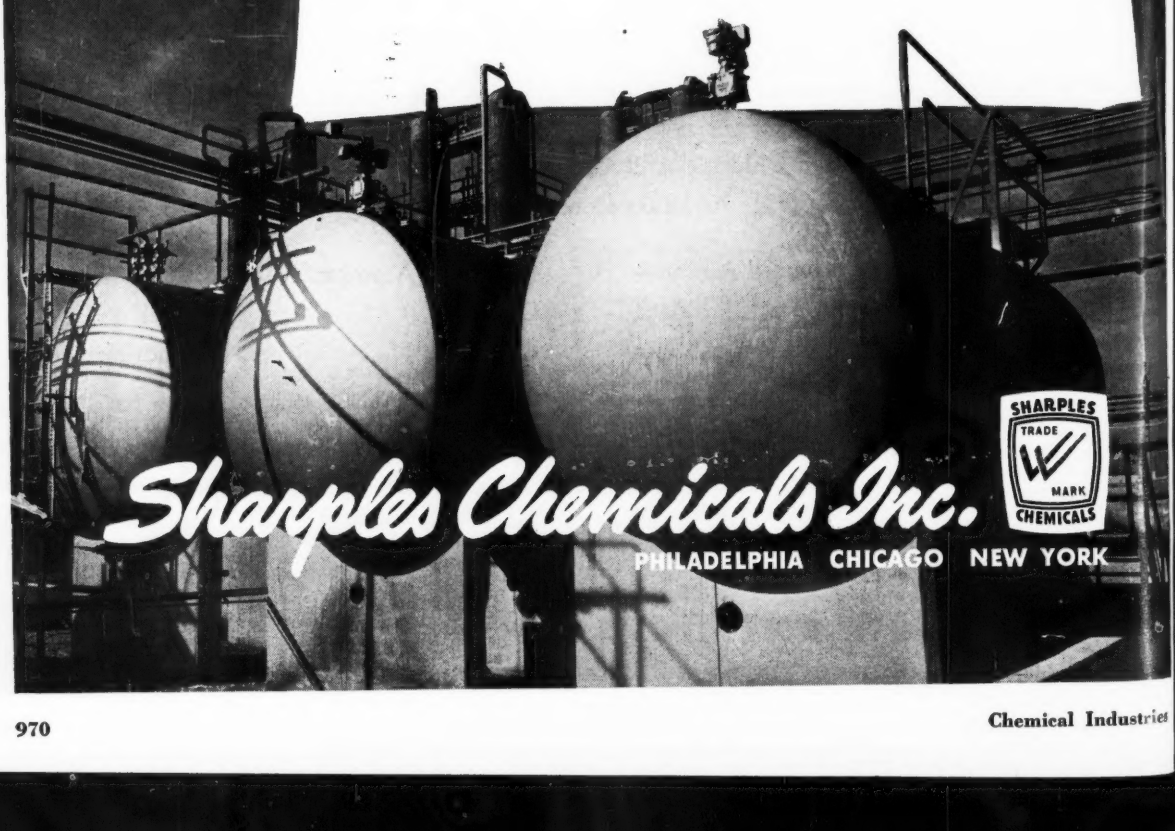
We suggest that you investigate the use of Ethylethanolamines 161 in your product.

Samples and technical information are available. Write to Dept. A



Sharples Chemicals Inc.

SHARPLES TRADE MARK CHEMICALS

PHILADELPHIA CHICAGO NEW YORK

NEWS OF THE MONTH

New Construction

The petroleum industry continues to grow. The two Ohio refineries of the Gulf Refining Co., at Toledo and at Cincinnati, are in full operation upon completion of an 18-month program of expansion and modernization which cost in excess of $35 million.

Production capacity of the Toledo refinery has been increased from 1,008,000 to 1,680,000 gallons of petroleum products a day. At Cincinnati the daily output can be increased from 1,000,000 to 1,168,000 gallons.

At both plants facilities for the manufacture and storage of propane or liquefied gas have been installed.

Heart of the new installations at both plants is a giant fluid catalytic refining unit, embodying the most modern refining techniques (see cut).

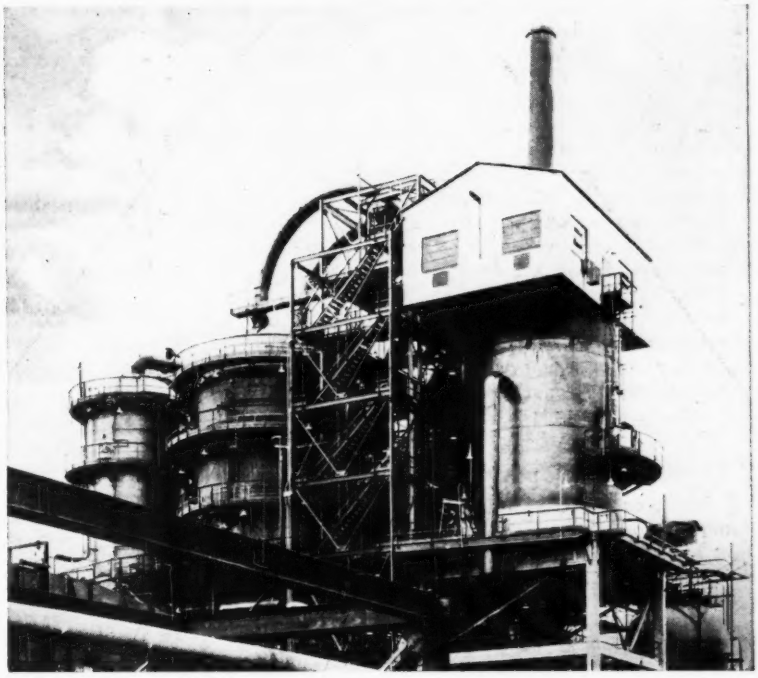
A new liquid resin plant will be built by Catalin Corp. of America at Calumet City, Ill. Phenolic, urea and melamine resins for use in waterproof adhesives and binders will be the products. Initial operation is scheduled for March 1950. Chemical Plants Division of Blaw-Knox Co. has the design and construction contract.

The need for manufacturing facilities in the San Francisco Bay area has led the Western Division of Monsanto Chemical Co. to purchase a small plant site at Santa Clara, Cal. Bids have been received and construction will begin in the near future on the plant which will produce synthetic resins and specialty coatings for the California area.

The National Advisory Committee for Aeronautics is having a new laboratory built at Cleveland, Ohio, to expand facilities for research in high energy fuels — they are needed for rocket and jet engines. The one-story building is designed to withstand explosive forces and insure complete safety of personnel. The H. K. Ferguson Co. is doing the job.

Another sign of chemical companies' betting on industrial research to keep them ahead in the increasingly competitive market: Shell Development Co. will erect a new four-story building at its Emeryville, Cal., laboratories. The space is needed to carry out research plans. The company spends a total of about $24 million a year in its worldwide research projects.

A substantial enlargement of its production facilities for alkyl amines has just been completed by Carbide and Carbon Chemicals Corp. Initial production of three ethyl amines—monoethyl, diethyl, and triethyl amines—and diisopropyl amine has already been made. At the same time, larger quantities of the other alkyl amines produced by Carbide will soon be available. The latter include mono- and di(n-butyl) amines, mono- and di(2-ethylhexyl) amines, and monoisopropyl amine.



Close-up of a "cat cracker": Giant fluid catalytic cracking unit at Gulf Refining Co.'s Cincinnati refinery (above) and a sister installation at the firm's Toledo plant are the heart of a $35 million expansion program at the two Ohio refineries.

Patent Licenses

Du Pont's yearlong search for a company with a yen to make cellophane and at least $20 million—estimated capital necessary to get into the business—ended with its licensing Olin Industries, Inc., to manufacture the product under its patents. Olin will be the third producer (American Viscose Co. is the other one). This may or may not make the Department of Justice a little happier since it has a suit charging Du Pont with monopolistic practices in making and selling cellophane that is scheduled for trial next year.

Under the terms of the contract Du Pont agrees to: license Olin under all its cellophane patents; furnish full technical information and know-how; assist in the selection of a plant site; design and build an eight-machine plant with an estimated capacity of approximately 33 million pounds of cellophane a year; help train personnel; assist in putting the plant into commercial operation.

Olin Industries' entry into the cellophane manufacturing business is a logical move, for the company has conducted intensive research for many years in cellulose and related materials and products in connection with its explosives and chemical business.

Philips Laboratories, Inc., has granted a license to Nopco Chemical Co., Harrison, N. J., for manufacturing vitamin D_3 under its patents. The suit filed by Philips against Nopco in the U. S. District Court of the district of New Jersey for alleged infringement of patent No. 2,441,091 will be discontinued.

Washington

Increasing minimum wages for companies selling to the Federal Government to 85¢ and 95¢ an hour was proposed by the chemical manufacturing industry through the Manufacturing

DOUBLE CHECKED from RESEARCH to INDUSTRY

use { SHARPLES ETHYLETHANOL-AMINES 161

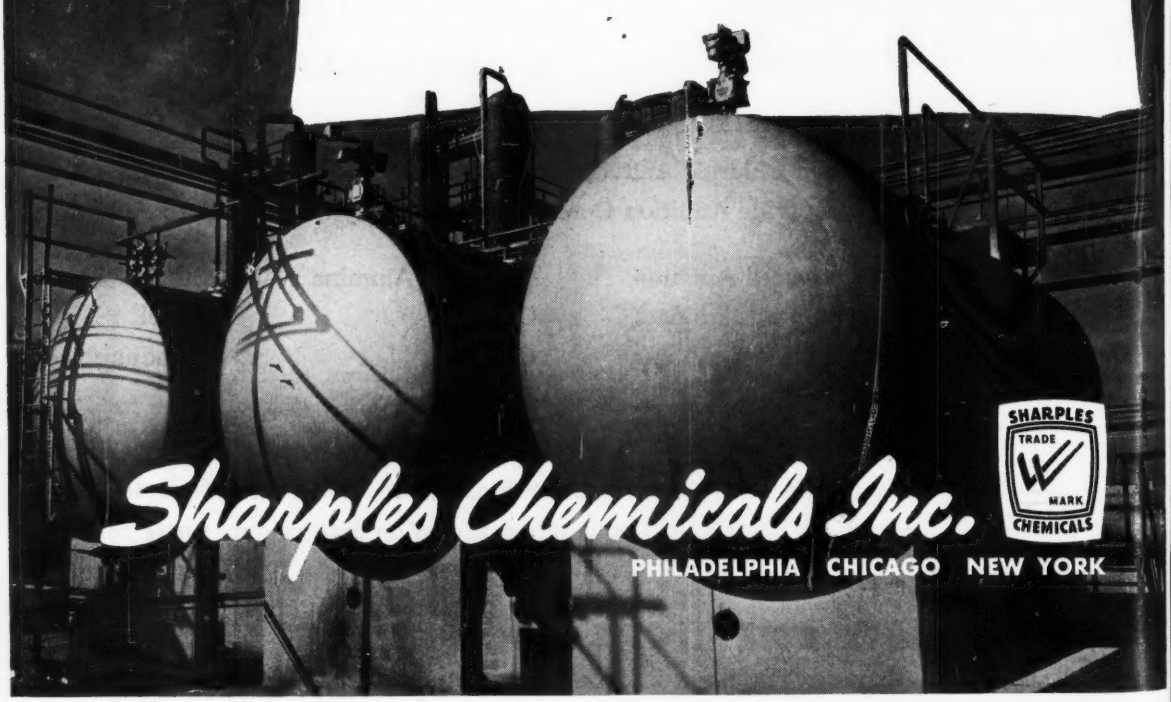
for Emulsions

Self-Polishing Floor Waxes	Emulsion Paints
Automobile Polish	Agricultural Sprays
Furniture Polish	Cosmetic Formulations
Textile Lubricants	Other Oil in Water Emulsions

Ethylethanolamines 161 is a mixture of ethylmono- and ethyldiethanolamines and is an efficient and economical intermediate for emulsion formation. Ethylethanolamines soaps formed by the reaction of this Sharples product and oleic and similar acids are efficient emulsifying agents.

We suggest that you investigate the use of Ethylethanolamines 161 in your product.

Samples and technical information are available. Write to Dept. A



Sharples Chemicals Inc.

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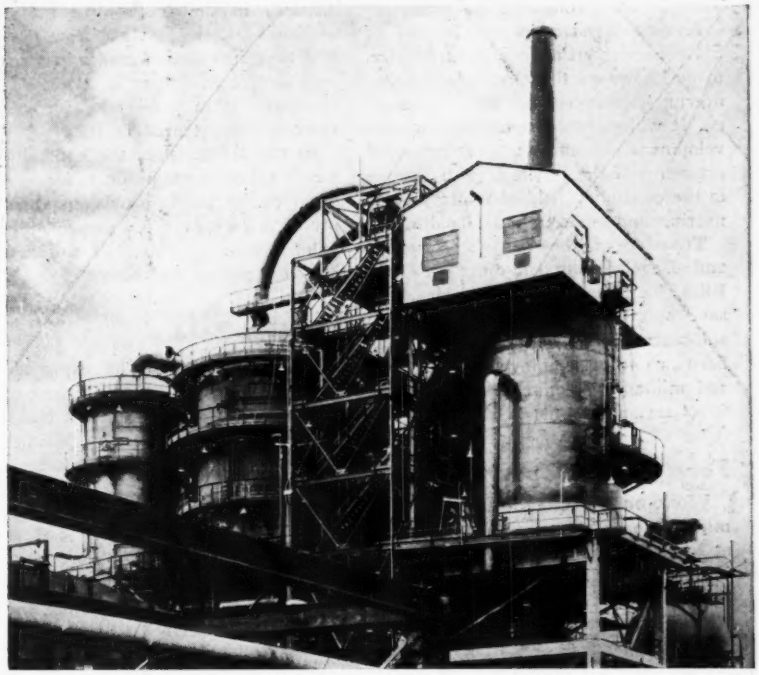

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Chemists Association at a Labor Department hearing looking toward revision of the present minimum of 40¢ in some Southern States and 50¢ elsewhere. The United Mine Workers made the request that a minimum of $1.28 be set throughout the nation.

A new division in the Bureau of State Services, Public Health Service, to be known as the Division of Engineering Resources, has been established. It will centralize planning and development of current and proposed programs of the Public Health Service in the expanding field of sanitary engineering and environmental health.

Transfer of the Army's Research and Development sub-office at Fort Bliss, Tex., to Huntsville, Ala., will save approximately $4.5 million. The sub-office, where work on rockets has been carried on, employed both civilian and military personnel, including over 100 German scientists.

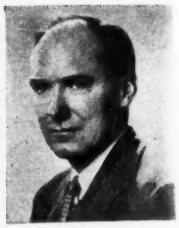
Foreign Developments

Work on the site of the new one million ton-per-year Condor refinery at Rho, near Milan, Italy, is progressing satisfactorily. It is quite possible that Condor will cooperate closely with Petrocarbon Ltd. (which has been responsible for the research, development, design, construction and starting up of the Petrochemicals Ltd. plant at Partington, near Manchester —the first large scale petrochemicals plant to go into operation in Great Britain) in the erection of the new Italian refinery, pipeline from Genoa and tank installation, and will also be very active in future in the field of chemicals from petroleum, for which there is a great need in Italy.

In the Netherlands the controls on nearly all chemical products have been removed. Rationing provisions still apply to raw coal tar, raw benzol, toluol, xylol, solvent naphtha 1, 2 and 3, carbolic oil, phenol and bones.

General Topics

Public officials can be expected to be forced to take action to stop continued pollution of rivers if a citizens' "grass roots" movement in Middlesex County, N. J., is any indication of things to come. Over 2,000 persons have joined the Restore the Raritan Society, a group whose aim is to stop pollution of the Raritan River in that county by bringing public sentiment to bear on responsible municipal, county and state officials.



John K. Conant (left), new vice-president of Regent Pulp & Chemical Co., Inc., and Abbott K. Hamilton, named a vice-president of Commercial Solvents Corp. For the past 9 years Mr. Conant was assistant director of purchases of the American Viscose Corp. Mr. Hamilton became associated with Commercial Solvents in 1947 when the company purchased the Pennsylvania Alcohol and Chemical Corp. of which he was an executive.

The first civil damage suit growing out of the Holland Tunnel blast (*CI, Sept. 1949, p. 337*) has been filed by the owners of a truck destroyed by fire following the explosion. Damages of about $18,000 are sought by the truck owner and its driver from the Boyce Motor Lines, owners of the truck that exploded in the tunnel, and the J. T. Baker Chemical Co., manufacturer of the carbon bisulfide that exploded.

The Second Interim Report on the Smog Problem in Los Angeles County

KESSCO PRODUCTS

Announcing

THE FORMATION OF

KESSCO CHEMICALS CORPORATION

for the distribution of

FATTY ACID ESTERS

manufactured by

KESSLER CHEMICAL CO., INC.

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NEW YORK 7, N. Y.

MERIT-WESTERN CO.
124 WHOLESALE STREET
LOS ANGELES 21, CALIF.

NOTES FROM THE NUCHAR purification notebook

ORGANIC CHEMICALS

Nuchar Activated Carbon is utilized to its fullest extent in the removal of impurities from organic chemicals. Not only does it decolorize and deodorize, but, in many instances, Nuchar removes other harmful impurities.

In a nutshell, here are Nuchar's plus factors in organic chemical purification:

1. Color removal where color is foreign to product.
2. Off-odors removed.
3. Side reaction products, if present in minute quantities, can be adsorbed.
4. Improved melting point of solid crystalline organics.
5. More uniform crystals formed as crystallization inhibitors are removed by Nuchar.
6. In cases of organic liquids, Nuchar treatment can replace distillation operations or even supplement distillation.
7. Better over-all sales appeal of product in addition to improved purity.

Consult our Nuchar Carbon Technicians regarding the grade best suited for your process and we will gladly send you a generous sample..

industrial CHEMICAL SALES

division west virginia pulp and paper company

SALES OFFICES

New York Central Bldg. 230 Park Avenue New York 17, N. Y.
Pure Oil Bldg. 35 E. Wacker Drive Chicago 1, Illinois
Public Ledger Bldg. Independence Square Philadelphia 6, Pa.
Leader Bldg. 526 Superior Ave., N.W. Cleveland 14, Ohio

OTHER PRODUCTS

SNOW TOP PRECIPITATED CALCIUM CARBONATE • LIQRO CRUDE TALL OIL
INDUSOIL DISTILLED TALL OIL • TALLENE TALL OIL PITCH • TALLEX ABIETIC ACID
SULFATE WOOD TURPENTINE • ALPHA PINENE • BETA PINENE • POLYCEL CELLULOSE FIBERS
INDULIN (LIGNIN)

presents the results of a two-year investigation of the source, nature, and mechanism of the Los Angeles smog. The Stanford Research Institute, which is making the investigation, has required the coordinated efforts of meteorologists, chemists, physicists, physiologists, and psychologists. The report describes new instruments and techniques of value wherever air pollution problems exist. The results are being made available to all interested organizations and persons.

Company Notes

General Controls, Glendale, Cal., has opened new and extensive factory branch office facilities in Minneapolis, Buffalo and Baltimore. This brings to 21 the number of factory branch offices in major cities from coast to coast.

The Panray Corp., suppliers of transparent and opaque quartzware, has moved its offices and laboratory to larger, improved quarters. The new address is 340 Canal St., New York, N. Y.

A branch office has been opened in Stockholm, Sweden, by the New York consulting engineering firm of R. S. Aries & Associates. The new office will coordinate the work on new product development, process design and sales development of the New York firm and was necessitated by the increase in activities in Scandinavia.

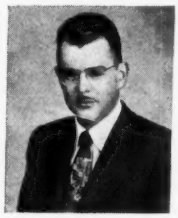
Chemical companies report the following earnings on past operations:

Company	*Net Income After Taxes Nine Months Ending Sept. 1949*	*1948*
Air Reduction Co., Inc.	$4,901,597	$4,697,138
Atlas Powder Co.	**1,179,330**	
Celanese Corp. of America	10,988,870	29,792,772
Commercial Solvents Corp.	2,483,278	4,305,443
E. I. Du Pont De Nemours & Co.	135,994,725	101,570,845
Freeport Sulphur Co. .	4,016,121	2,842,729
Lion Oil Co.	6,422,441	8,438,043
Mathieson Chemical Corp.	5,190,700	3,266,662
Monsanto Chemical Co.	11,555,833	
National Lead Co.	10,779,881	
Penick & Ford, Ltd., Inc.	1,565,378	1,306,089
Phillips Petroleum Co.	32,684,666	55,702,772
Sterling Drug, Inc. ...	11,090,772	11,017,438
Union Carbide and Carbon Corp.	66,429,392	73,596,110

	Three Months Ending Sept. 1949	*1948*
The Davison Chemical Corp.	296,000	428,000
Texas Gulf Sulphur Co.	**5,672,091**	

	Twelve Months Ending June 1949	*1948*
International Minerals & Chemical Corp....	5,421,017	5,016,028

The Superheater Co., Ltd., Montreal, Canada (in conjunction with its affiliate, Combustion Engineering Corp., Ltd.) has been appointed to represent the De Laval Steam Turbine Co. of Trenton, New Jersey. It will sell and service De Laval turbines, pumps, gears and compressors in the Provinces of Newfoundland, New Brunswick, Nova Scotia, Prince Edward and Quebec.



Harry F. Pfann (left), appointed manager of the product development department of Pittsburgh Coke & Chemical Co., and Bryan C. Redmon, named assistant director of organic chemical research of U. S. Industrial Chemicals, Inc. Mr. Pfann came to Pittsburgh Coke & Chemical from Koppers Co., Inc. Dr. Redmon joined U. S. Industrial Chemicals in 1946.

The Platecoil Division of the Kold-Hold Manufacturing Co., Lansing, Michigan, has appointed the following four new eastern representatives to provide engineering assistance in connection with the Platecoil method of tank heating: The Paul B. Huyette Co., Inc., Philadelphia; H. R. Houghton Co., Baltimore; W. B. Parsons Co., Boston; Gerald B. Duff Co., Newark, N. J.

Fritzsche Brothers, Inc., New York, has again been awarded the State In-

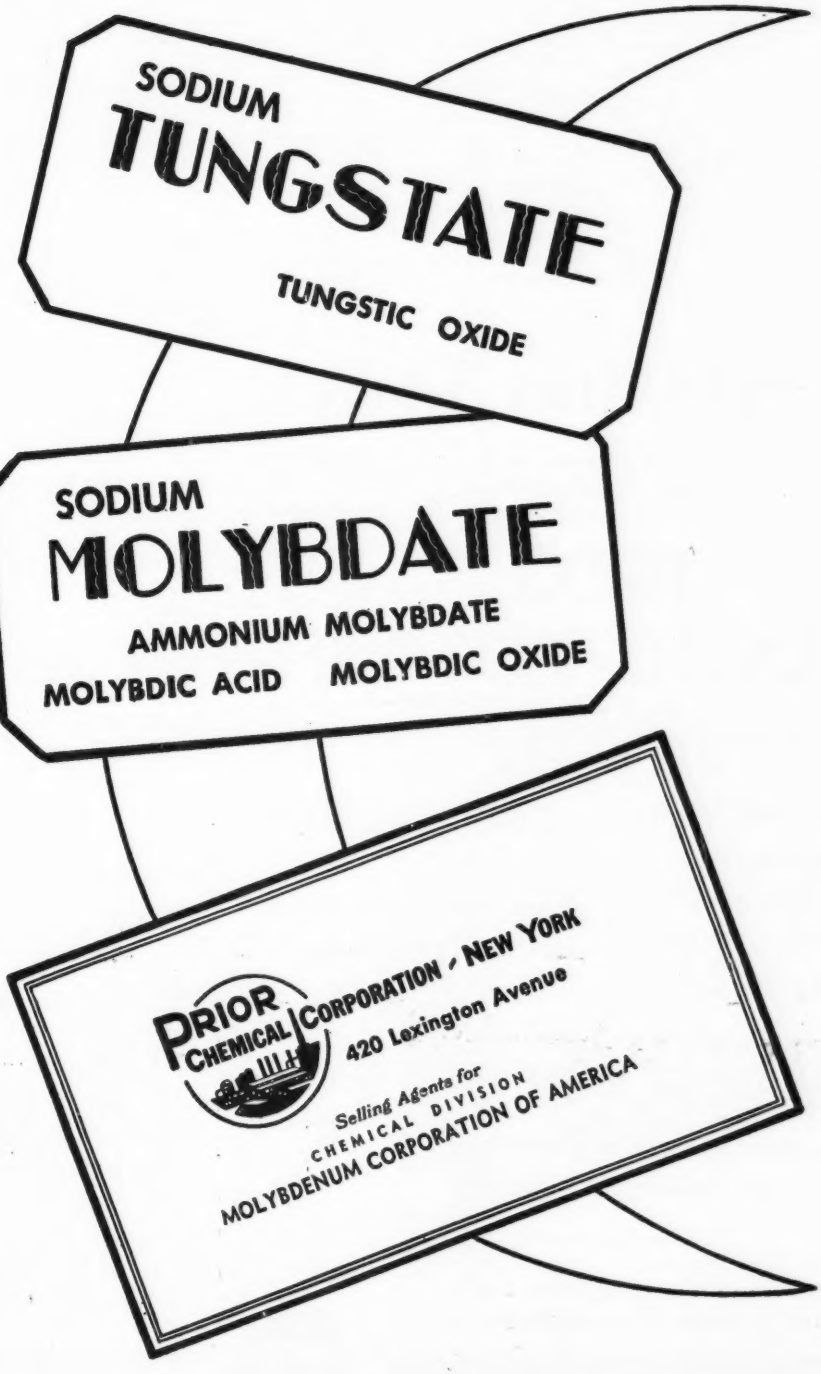
KOPPERS

coal chemicals

KOPPERS COMPANY, INC.
TAR PRODUCTS DIVISION
Pittsburgh 19, Pa.

KOPPERS

benzol
toluol
xylol
phenol
cresols
xylenols
cresylic acid
crystal free neutral oil
tar acid oils
pyridine
picolines
lutidines
quinoline
naphthalene, (crude and refined)
ammonium sulphate
ammonium thiocyanate
acenaphthene
beta methyl naphthalene


SODIUM
TUNGSTATE
TUNGSTIC OXIDE
SODIUM
MOLYBDATE
AMMONIUM MOLYBDATE
MOLYBDIC ACID MOLYBDIC OXIDE
PRIOR CHEMICAL CORPORATION / NEW YORK
420 Lexington Avenue
Selling Agents for
CHEMICAL DIVISION
MOLYBDENUM CORPORATION OF AMERICA

surance Fund of New York Placque for its continuing record of no-employee-time-lost due to accidents.

The Edwal Laboratories, Inc., has transferred its sales and administrative offices and research laboratories to its plant at Ringwood, Ill. This move will enable Edwal to make fuller use of expanded facilities at Ringwood where the plant has been located since 1941.

PERSONNEL

Company Officers

• R. E. Price, chief chemist of **Crosby Chemicals, Inc.,** has been elected vice-president of the corporation. Mr. Price joined the company in August of 1937 as research chemist and later developed the process of making Pale Wood Rosin. He is the first person, other than a member of the Crosby family, who has been an executive officer in any Crosby organization.

• James P. Margeson, Jr., executive vice president of **International Minerals & Chemical Corp.,** has been elected a director of the corporation. He has been associated with International Minerals & Chemical Corporation since 1940 and has been executive vice president of the company since June 26, 1947.

Production

• Ollie Middlebrooks has been appointed general superintendent of the **Continental Carbon Co.,** Sunray, Texas, plant and the **Witco Carbon Co.,** Eunice, New Mexico, plant. He was formerly superintendent of the Sunray plant.

• John W. McSwain has been appointed supervisor of consumer fabrics production for **United States Rubber Co.'s** textile division.

Sales

• Amos W. Oakleaf has been named as **Phillips Chemical Co.'s** sales manager in charge of foreign and domestic sales of furnace blacks, Philblack A and Philblack O. He joined Phillips in 1944. He will headquarter in the Phillips Chemical Company sales office at Akron, Ohio.

Research

• **Harris Research Laboratories** has appointed Alfred E. Brown as an assistant director of research, and Anthony M. Schwartz as manager of the new Industrial Chemicals Division. Dr. Brown will direct an extended program of research in the field of protein fibers; Dr. Schwartz will supervise work on surface active agents and other industrial chemicals.

• **Hercules Powder Co.** has named Peter VanWyck, formerly technical assistant in the Research Department, assistant director of the Experiment Station.

Died

• Bernard R. Armour, fifty-eight, president of the **Heyden Chemical Corp.** and **American Aniline Products, Inc.,** died in Roosevelt Hospital, New York, N. Y., December 1.

• Carl G. Amend, former president of **Eimer & Amend,** died at his home in Brewster, N. Y., November 28. He was 62.

ISCO OPERATION News

DECEMBER, 1949

ISCO
CAUSTIC POTASH

Produced in the Isco Plant at Niagara Falls, N. Y.

REGULAR GRADES
for all purposes
FLAKE • SOLID • 90%
CRUSHED AND BROKEN
LIQUID FF 45-50%

SPECIAL QUALITY
Liquid FC 45%
Extra low in chloride and iron — for use where special purity is required.

AMERICAN SELECTED WALNUT CAUSTIC POTASH
For the absorption of moisture and CO_2 in the air liquefaction industry

Stocks maintained at New York and branch Warehouses

ISCO
INNIS, SPEIDEN & CO.
117 LIBERTY ST., NEW YORK 6
BOSTON CHICAGO CLEVELAND CINCINNATI GLOVERSVILLE PHILADELPHIA
SUBSIDIARY E. S. BROWNING CO., INC. SAN FRANCISCO • LOS ANGELES

CALENDAR *of* EVENTS

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 116th meeting, Statler Hotel, New York City, Dec. 26-31.

AMERICAN DRUG MANUFACTURERS ASSOCIATION, Boca Raton Club, Boca Raton, Fla., March 27-30.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting, Houston, Texas, Feb. 26-March 1.

AMERICAN MANAGEMENT ASSOCIATION, St. Francis Hotel, San Francisco, Jan. 18-20.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS AND SOCIETY FOR ADVANCEMENT OF MANAGEMENT, conference, Auditorium, Cleveland, O., Jan. 16-19.

AMERICAN SOCIETY FOR TESTING MATE[illegible] William Penn Hotel, Pittsburgh, Pa., [illegible]h 2.

ASSOCIATION OF SOAP AND GLYCERINE PRODUCERS, annual convention, Hotel Plaza, New York City, Jan. 25-26.

CHEMICAL MARKET RESEARCH ASSOCIATION, Statler Hotel, Detroit, Feb. 2.

COMPRESSED GAS ASSOCIATION, Waldorf-Astoria Hotel, New York City, Jan. 23-24.

DRUG, CHEMICAL AND ALLIED TRADES SECTION, New York Board of Trade, annual dinner, Waldorf-Astoria Hotel, New York City, March 9.

NATIONAL PLASTICS EXPOSITION, Navy Pier, Chicago, March 28-31.

SOCIETY OF THE PLASTICS INDUSTRY, reinforced plastics division meeting, Hotel Cleveland, Cleveland, O., Jan. 10-12.

SOCIETY OF PLASTICS ENGINEERS, INC., national technical conference, Hotel Carter, Cleveland, O., Jan. 11-13.

CROSBY

THE MARK OF QUALITY

Crosby Chemicals, Inc., with two large modern plants in full production and with an abundant supply of raw materials can take care of your requirements of—

STEAM DISTILLED WOOD TURPENTINE
TERPENE HYDROCARBON SOLVENTS
STEAM DISTILLED PINE OILS
HEAT TREATED WOOD ROSINS
NAVAL STORES SPECIALTIES
PAPER SIZE, ALL GRADES
RESINOUS CORE BINDERS
SYNTHETIC PINE OIL
LIMED WOOD ROSINS
PALE WOOD ROSINS
BEREZ WOOD RESIN
ALPHA TERPINEOL
RESIN SOLUTIONS
P. E. ESTER GUM
TERPIN HYDRATE
FF WOOD ROSIN
ALPHA PINENE
BETA PINENE
GLOSS OILS
ESTER GUMS
TERPINEOL
DIPENTENE
ROSIN OIL
CAMPHENE

Crosby Chemicals, Inc., is the only producer of Steam Distilled Wood Naval Stores Products who at present is authorized to mark their products "U. S. Government Inspected and Certified" at source of production.

REPRESENTATIVES IN ALL PRINCIPAL CITIES

CROSBY CHEMICALS, INC.
DE RIDDER, LOUISIANA
Plants: Picayune, Miss., and De Ridder, La.

FAIRMOUNT CHEMICALS

- HYDRAZINE BASE
- HYDRAZINE HYDRATE 85% 100%
- HYDRAZINE SULFATE COMMERCIAL and C.P.

  Use: Manufacture of intermediates for dyes and pharmaceuticals. Hydrazine Base has solvent properties similar to liquid ammonia.

- SEMICARBAZIDE HYDROCHLORIDE COM'L. and C.P.

  Use: Isolation of ketones and aldehydes, forming well-defined crystalline compounds.

- SODIUM AZIDE
- SODIUM CYANATE
- IODIC ANHYDRIDE
- IODIC ACID
- LIGHT SENSITIVE DIAZO SALTS
- DYE COMPONENTS

  Use: The stabilized Diazo Salts are used together with the Dye Components for coating light sensitive diazo type papers.

FAIRMOUNT CHEMICAL CO., INC.
136 Liberty Street New York 6, N. Y.

Greeff

NORIT ACTIVATED CHARCOAL
USP XIII

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AMERICAN NORIT CO., INC.
Plant at Jacksonville, Fla.

R. W. GREEFF & CO., INC.
10 ROCKEFELLER PLAZA, NEW YORK, N. Y.
TRIBUNE TOWER, CHICAGO, ILLINOIS

JAPAN WAX
CARNAUBA

CANDELILLA
BEESWAX
and substitute waxes

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SHELLAC
Direct Importers
from our own sources

GUM
BENZOIN

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DIEHL
& COMPANY
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New York, N. Y.
BRyant 9-5211
Cable Address: DIEHLWILL

CHEMICAL MARKETS

Lower Prices Likely for Fats and Oils

Prices of most fats and oils probably will average lower in the year beginning October 1949 than a year earlier, in the opinion of economists in the Department of Agriculture's Bureau of Agricultural Economics. Domestic production is likely to increase moderately, and domestic demand for fats and oils probably will decrease slightly. Export demand for fats and oils also may decline with continued improvement in available world supplies. However, foreign demand will still be stronger than in most prewar years, and exports probably will be very substantial again in 1949-50. This will tend to moderate declines in prices of fats and oils in the U. S.

Price trends of fats and oils in recent months have tended to re-establish prewar price relationships among various products. Reflecting a reduced price for the 1949 crop of flaxseed, the price of linseed oil (raw, tank cars, Minneapolis) declined from about 27 cents per lb. in the early spring of 1949 to 17 cents per lb. in late Oct. Prices of fast-drying oils advanced from mid-1948 to early Oct. as a result of continuing small imports of tung oil. These changes have left linseed oil priced below fast drying oils, as before the war.

Prices of major imported oils other than drying oils declined materially from early 1949 to early Oct. Declines in these prices continued through the late summer, while prices of most domestic fats and oils were higher in early Oct. than in July. Wholesale prices of domestic fats and oils (butter and linseed oil excluded) in early Oct. averaged about 120% of the 1935-39 level compared with 115% in July 1949 and 202% in Oct. 1948. Wholesale prices of coconut, palm and other imported oils, except drying oils, in early Oct. 1949 averaged about 190% of 1935-1939 compared with 216% in July 1949 and 296% in Oct. 1948. The decline in prices of these imported oils during 1949 was mainly a consequence of competition in European markets with U. S. lard, soybean oil, and other edible oils, which reached Europe in early 1949 in unprecedented quantities and at reduced prices.

Coast Chemical Trade On the Increase

The West Coast has shared significantly in the overall expansion of the chemical industry and trade of the United States, with the combined chemical export-import trade of California, Oregon and Washington now approximating $75 million annually, a three-fold increase over 1938. Such a record of growth is noteworthy because the region's industry is predominantly agricultural and extractive. These are the conclusions of C. C. Concannon, chief, Chemical Branch, Office of International Trade, writing on "Pacific Coast International Chemical Trade" in a recent issue of *Foreign Commerce Weekly*.

Moreover, the 1949 pace of these three states is being maintained at the high levels of recent years, with a $40 million volume of chemical trade being achieved in the first half of 1949. This is exclusive of military shipments.

Exports are moving briskly and in the first 6 months of 1949 were at $27.5 million—double the figure for the entire 12 months of 1938. Some Pacific Coast chemicals—such as alkalies, borates, and acetone—have attained global distribution and represent a large proportion of world consumption.

The trend of imports is definitely upward, reaching $13 million for the half-year, equaling 10 per cent of the national rate and keeping in line with the Coast's proportion to total population. Now California, Oregon, and Washington account for 10 per cent of United States inhabitants and 10 per cent of the Nation's chemical imports. A good part of these foreign purchases, such as varnish gums, paint oils, creosote oil, and fertilizer materials, is used in many industries.

Insecticide Exports Expand Six-Fold

U. S. exports of insecticides and related materials increased six-fold in the past 10 years and should maintain their high level despite growing foreign competition, according to a Department of Commerce report.

Exports of weed killers, fungicides, rodenticides, etc., rose from $4,975,000 in 1939 to $28,622,000 in 1948. Shipments in 1949 continue at virtually the 1948 level —$15,649,000 in the first six months. In 1939 U. S. output of insecticides and related materials totaled slightly less than $50,000,000, about 10 per cent of which was exported. Production in 1948 was estimated at approximately $135,000,000 and exports equaled 21 per cent, a considerable rise in ratio and above comparable ratios for most chemical products.

North America remains the major market for U. S. insecticides, exports to that area rising from $1,879,000 in 1939 to $10,860,000 in 1948 ($5,888,000 in first half of 1949). In 1948 Europe held sec-

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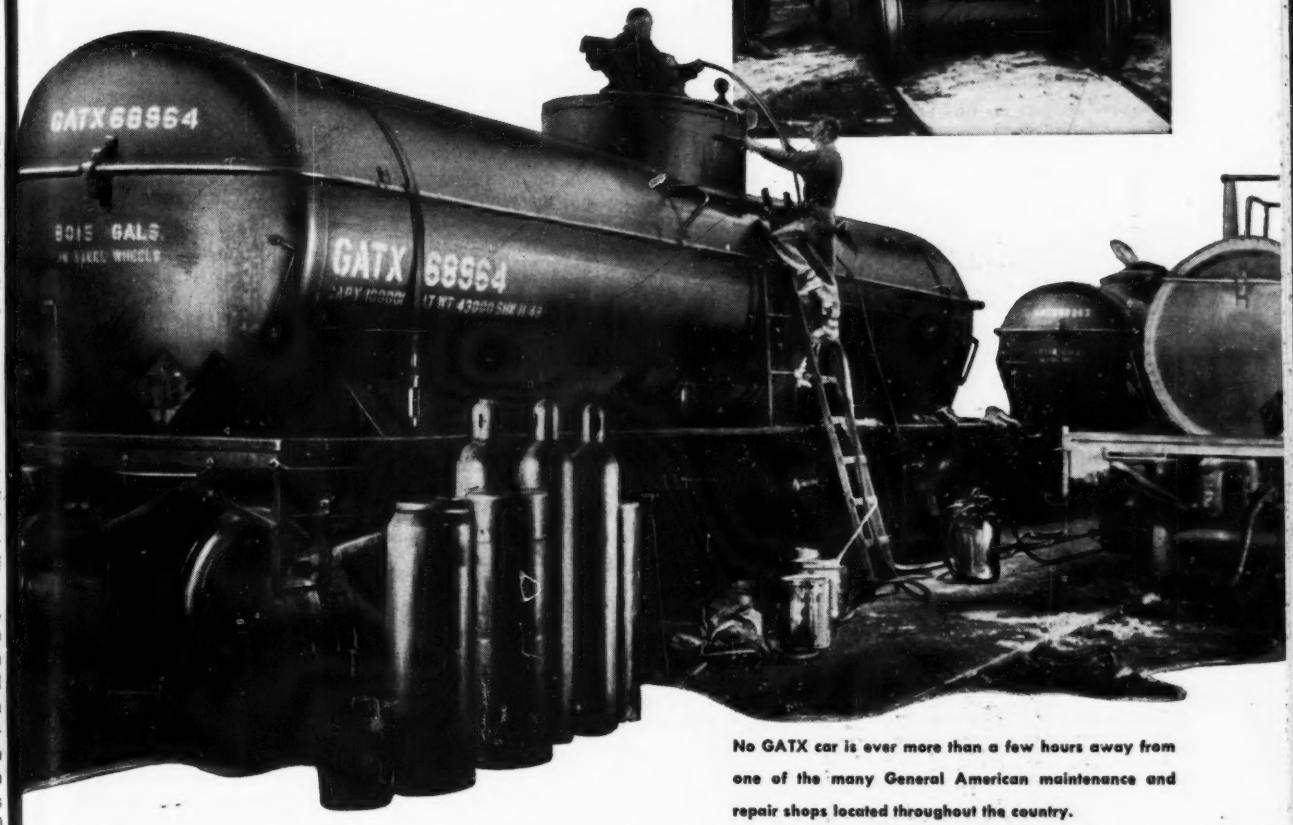

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ond place with a total of $6,496,000, a variation from the prewar pattern, when South America ranked second.

Looming large in this record of growth have been the new synthetic agricultural chemicals. Such materials as DDT, chlordane, benzene hexachloride, the phosphatic insecticides, thiocyanates, weed-killers (principally 2,4-D), soil fumigants and wood preservatives are listed in the "other agricultural insecticides and related materials" category which far exceeds any other class of insecticides in value of exports. This category rose from a little over $1 million in 1939 to almost $14 million in 1948, and it was closely maintaining that pace in the first half of 1949.

Exportation of household and industrial insecticides, which rose from $1,583,000 in 1939 to $5,754,000 in 1948, will probably show a considerable decline in 1949, since exports in the first half of the year were only $1,748,000.

With exports of insecticide now constituting an important portion of sales, manufacturers will strive to maintain or increase shipments abroad. Although the U. S. produces the greatest amount and variety, stiff competition can be expected from the United Kingdom's substantial industry, and from other nations contemplating erection of facilities to produce the newer materials.

Inorganic Production Generally Higher

United States production levels of industrially important inorganic chemicals for August 1949 were generally higher than for July 1949 and about the same as for August 1948, according to the Bureau of the Census, Department of Commerce. Of the 35 chemicals included in the Bureau's monthly survey, 28 were produced in larger volume during August than during July, and 4 in smaller volume, while 15 were produced in larger volume, and 17 in smaller volume than during August 1948.

August production of synthetic anhydrous ammonia, synthetic ammonium sulfate and carbon dioxide, solid (dry ice) was the highest on record. Of the four chemicals produced in smaller volume for August, ammonium nitrate declined 4 per cent, calcium arsenate 3, calcium carbide 6, and silver nitrate 19 per cent.

Market Review

One of the worries of the chemical industry passed with the settlement of the steel strike, but there was still the uncertainty of a resumption of the coal strike to prevent complacency. The price trend in general continued down, and markets were generally dull.

This characteristic dullness was quite noticeable in heavy chemicals. Chlorine continued tight, however, and there was improvement in shipments of caustic soda and soda ash, some traceable to inquiries for caustic from Hong Kong.

Settlement of the steel strike saw improvement in coaltar chemicals after an extended period in which toluol, benzol and xylol were tight, and synthetic phenol was being threatened. In fact, it was welcome news to find steel companies exceeding expected production with resumption of operations. The shortage had carried over to all benzene derivatives, and the tightness of aniline and its products was characteristic of the firm tone of the dyestuffs intermediate field.

Non-ferrous metals were weak. Quicksilver, with large imports boosting stocks, was cut; so was tin and lead. Lead sulfates, silicates, linoleate, naphthenate; metallic paste; tetraethyl lead; sodium stannate; leaded zinc oxide and antimony sulfide were reduced. Zinc and copper were advanced, but the advance did not carry over to zinc pigments as it did to copper-based chemicals.

The generally weak fats and oils were strengthened by heavy buying of crude cottonseed oil by refiners, government purchases of soybean and word that the Philippine Island typhoon had damaged the coconut crop. The latter boosted coconut oil prices and resulted in limited offerings of both oil and copra. Tung oil, still tight, was advanced.

Among agricultural chemicals, 2,4-D was slashed 12¢ a pound to a carlot price of 43¢ a pound. Its isopropyl ester and other formulations were also reduced. Stocks of pesticides piled up as farmers eschewed forward buying —a practice that may haunt them in the consuming season.

Prices of botanical drugs stayed firm despite the lack of real activity. Demand for pharmaceuticals was generally down. Two notable reductions occurred in para-amino salicylic acid and its sodium salt. Para-amino benzoic acid and procaine hydrochloride advances were more than offset by reductions in other materials. Penicillin was at an all-time low.

Essential oils were generally stronger throughout the period. This was attributable to a greater seasonal demand and to reduced offerings of some oils.

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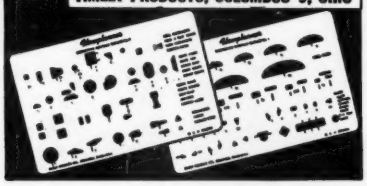

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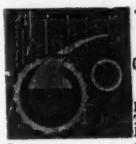

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Ultrasonics

(Continued from page 885)

dustrial use in ultrasonics. Much effort has been put into research on artificial production of quartz and some promising results have been obtained, but crystals large enough for industrial ultrasonic applications would still be prohibitively expensive.

A solution to the problem of supplying large-size generators of ultrasonic energy came from scientists at the Titanium Alloy Manufacturing Co. (now a division of National Lead Co.), who found that certain ceramic materials containing titanium exhibited a dielectric capacitance far in excess of anything known before. War-time research led to the conclusion that this ceramic can be made to possess electric properties which show a striking analogy to the magnetic properties of iron and a mechanical response to applied electric energy which makes it comparable and in certain ways superior to the piezoelectric crystals such as quartz. Brush scientists developed forms of ceramic "transducers" of electrical energy into ultrasonic sound energy which show operating characteristics entirely different from piezoelectric-crystal transducers or magnetostrictive devices.

Brush has developed techniques and methods of producing finished ceramic elements in a variety of shapes. Thus it is now possible to build large industrial-type transducers to fit practically any specific purpose. The ceramic material may take the form of a spherical shell or a cylindrical tube which concentrates the sound energy in a specific operating area.

One characteristic of piezoelectric crystals previously used is that the electrical driving voltage must be applied in a fixed direction and results in a mechanical action in a fixed direction. In the ceramics this limitation is not present. In ceramic elements the direction of the mechanical action is determined by a polarizing electric field applied during manufacture and its direction may be made to vary at will from one point of the transducer to another. For example, in a tubular transducer element, the polarizing direction may be at all points directed toward the central axis of the tube. Thus it is possible to obtain ultrasonic waves emanating uniformly from a curved surface; the waves thus produced may be concentrated into a limited area where a sound-energy concentration is obtained which is even much greater than on the surface of the ceramic element.

Another advantage of ceramic elements is their ability to develop high power without the need of high voltages, as encountered in quartz-crystal generators.

New Equipment

(*Continued from page 947*)

• A new Speedomax *recorder* now automatically plots the relationship between two variables, showing one as a function of the other. Tedious compilation and manual plotting by experienced personnel are eliminated. Instead, the variables to be plotted are converted d-c signals, and connected to the instrument, one to the horizontal axis and the other to the vertical axis. The result is a permanent record, accurately plotting in minutes data that would require hours using the usual point by point method.

As compared to the usual recorder, which has only one measuring circuit and a constant speed non-reversing chart paper drive and which plots a variable as a function of time, this new recorder has two measuring circuits. Pen travel (X axis) is controlled by the Speedomax G electronic circuit. A similar circuit controls the chart paper drive (Y axis), and makes it reversible. Thus, the new recorder make its possible automatically to draw curves such as a hysteresis loop, temperature vs. temperature difference, stress vs. strain or other two variable curves.

• An improved Type 22 *air hose,* with the tube and rubber made of oil-proof rubber compounds, has been developed by The B. F. Goodrich Co., Akron, Ohio. Three-ply fabric reinforcement and dimensions of the Type 22 continue the same. The hose is made with a smooth finish red cover with extra toughness to resist weathering and sun checking. Strong adhesion of cover to the carcass enables the hose to withstand repeated bending and flexing with less danger of separation. The hose can now be used for a variety of applications besides its primary one as an air hose, including handling petroleum solvents and lubricating oils.

The hose is made in ¼ inch, 5/16 inch and ⅜ inch sizes. Outside diameters are respectively ½, 9/16 and 21/32 inches, and weight per 100 feet 10.3, 12.2 and 15.1 pounds. The two smaller sizes withstand 150 pounds working pressure, the larger, 125 pounds.

• A new *direct-positive film* for making top-quality reproductions of engineering and architectural drawings and of maps and physical surveys has been developed by the Eastman Kodak Co., Rochester, N. Y.

Known as Kodagraph Autopositive Film, the new film may be handled in normal room light and produces a positive copy directly from a positive original drawing, without a negative step. It may be exposed on blueprint or whiteprint equipment or other copying machines having a high-intensity light source.

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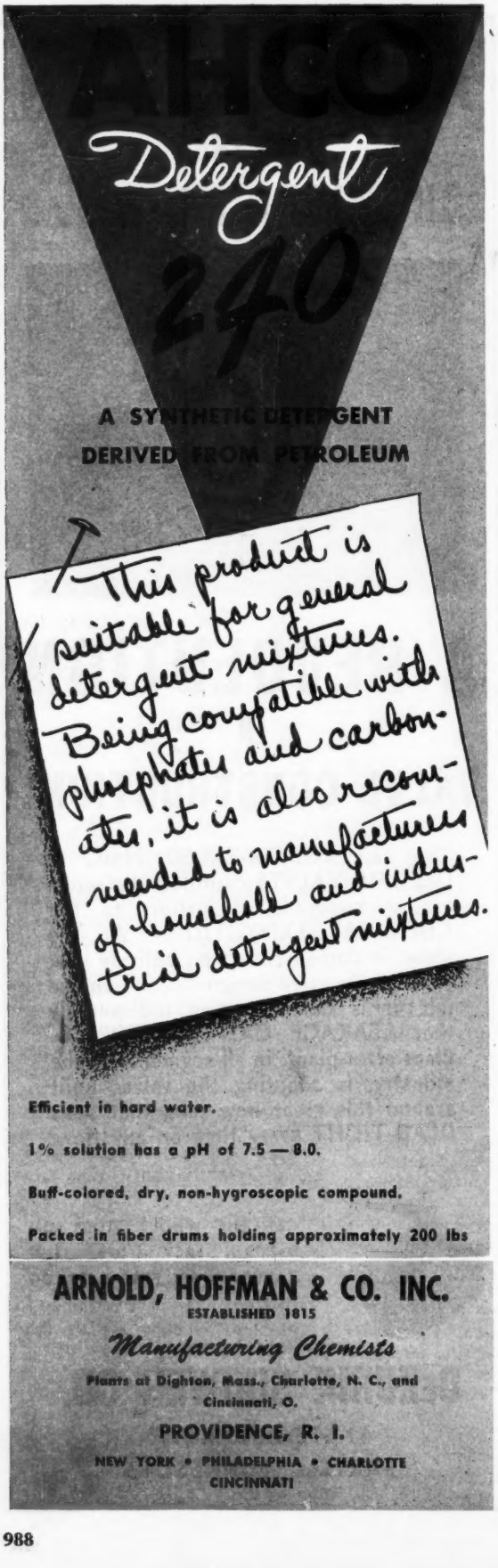
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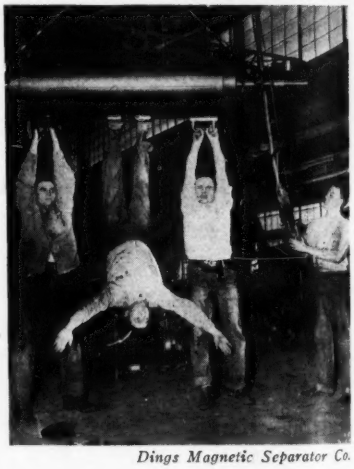

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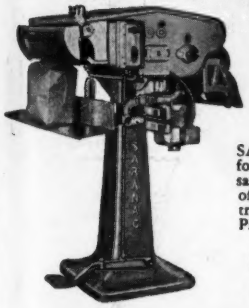

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U. S. Patents from Official Gazette—Vol. 625, Nos. 1, 2, 3, (August 2-16)

*Specialties**

In production from a subsurface formation of a corrosive fluid mixture having an acid reaction and including hydrocarbon, water, and carbon dioxide, which is brought into contact with ferrous metal, the step of introducing an acidic phenolic material to inhibit the corrosive action. No. 2,477,321. Prentiss S. Viles and Elza Q. Camp (to Standard Oil Development Co.).

*Textiles**

In a continuous process for obtaining zein synthetic fibers, the steps of extruding an aqueous alkaline solution of zein into an aqueous coagulating bath containing formaldehyde; sulfuric acid; and salt material selected from the group consisting of water-soluble inorganic salts and admixtures of said salts. No. 2,475,879. Edward Terry Cline (to E. I. I. du Pont de Nemours & Co.).

Treating fibers of a copolymer of vinylidene chloride and a compound of the group consisting of vinyl chloride and vinyl esters of monocarboxylic acids which comprises subjecting the fibers to the action of a bath consisting of a swelling agent from the group consisting of cyclohexanone and a mixture of cyclohexanone and methyl ethyl ketone. No. 2,476,069. James E. Snyder (to Wingfoot Corp.).

In the melt-spinning of poly-1:2:4-triazoles, maintaining an atmosphere of saturated steam above the molten polymer being spun. No. 2,476,968. James Wotherspoon Fisher and Edward William Wheatley (to Celanese Corp. of America).

Conditioning a thread made by twisting together at least two oriented yarns prepared from synthetic linear polyamides, by impregnating said thread with formaldehyde. No. 2,477,156. Joseph Elmer Waltz (to E. I. du Pont de Nemours & Co.).

*Water, Sewage, etc.,**

Producing an agglomerated water treating product, which comprises preparing a substantially dry and homogeneous mixture consisting of a water-soluble molecularly dehydrated sodium phosphate together with a water-soluble wetting agent selected from the group consisting of alkylated aromatic sulfonates, alkyl sulfonates, and alkyl sulfates, and hydrated sodiu mcarbonate. No. 2,477,492. Joe E. Moose (to Monsanto Chemical Co.).

Agricultural

Combined litter, germicide and insecticide, comprising a heated mixture of finely pulverized quartz and feldspar with the admixture of tobacco ashes No. 2,477,892. Armas Paquette.

Recovering nicotine comprising distilling a comminuted and alkalinized nicotine-bearing plant material, and adding water to the still during the distillation in a quantity sufficient to distill out substantially all of the nicotine. No. 2,478,473. Roderick Koenig Eskew (to U.S.A. by Secretary of Agriculture.)

Fungicidal composition comprising a phenyl mercury salt and lactic acid. No. 2,479,275. Frank J. Sowa.

Cellulose

In production of improved high tenacity cellulosic yarns, the steps which comprise incorporating a non-volatile, substantially water-insoluble plasticizer saponifiable to water-soluble products in a yarn having a basis of an organic acid ester of cellulose, stretching the plasticized yarn in the presence of a softening medium, and completely saponifying the stretched, plasticized organic acid ester of cellulose yarn whereby a plasticizer-free regenerated cellulose yarn is obtained. No. 2,478,331. Celanese Corp. of America.

Treating a cellulosic material with an acidic aqueous solution containing chlorine by preparing an aqueous solution containing chlorine and a product of dissolving a nitrogen-containing compound therein, said nitrogen-containing compound being selected from the group consisting of ammonia, mono-substituted ammonia, disubstituted ammonia, salts of ammonia, salts of monosubstituted ammonia, and salts of disubstituted ammonia and subjecting the cellulosic material to treatment with said solution. No. 2,478,379. Hercules Powder Co.

Continuous esterification of cellulose by continuously passing cellulose sheet through a 2-section pretreatment, in which lower fatty acid is flowed through the sections in reverse order to that which the cellulose takes, whereby anhydrous liquid lower fatty acid is flowed through the second section to remove water from the cellulose sheet passing there-through, which acid when spent is flowed through the first section thereby swelling to a high degree the cellulose sheet passing there-through. No. 2,478,383. Eastman Kodak Co.

Preparing cellulose acetate butyrate having a high butyryl content from a cellulose containing a small amount of hornified amorphous material which is resistant to acylation which consists in first boiling the cellulose in suspension in a low mineral content water, subjecting the cellulose to pressure to remove water, displacing the water in the cellulose with acetic acid and then esterifying the cellulose with an esterification mixture comprising butyric anhydride and an acylation catalyst. No. 2,478,396. Eastman Kodak Co.

Continuously preparing cellulose for esterification which comprises continuously passing a cellulose sheet into a bath of an aqueous lower fatty acid containing 2-10% of water and treating the cellulose with that liquid to impart activation to the cellulose, then passing the sheet through squeeze rools followed by passing the sheet into a 2-7% solution of an acylation catalyst in a lower fatty acid and treating the cellulose therewith. No. 2,478,425. Eastman Kodak Co.

Ceramics

Glass having a relatively high index of refraction, consisting of boric oxide, glass vitrifying oxide selected from the group consisting of phosphoric oxide, arsenic oxide, antimony oxide, lanthanum oxide, tantalum oxide, thorium oxide and mixtures thereof, and the balance consisting of high index of refraction metal oxide selected from the group consisting of zinc oxide, cadmium oxide, lead oxide, bismuth oxide and mixtures thereof. No. 2,477,649. American Optical Co.

Glass batch composition comprising silica, alkali earth metal carbonate which is a flux, finely divided clay and alkali metal flux, a compound of a class consisting of sodium and potassium carbonates, salt cake and borax all intimately but mechanically mixed. No. 2,478,151. George J. Bair to Norbert S. Garbisch.

Porcelain glaze comprising a mixture of whiting, ball clay, potash feldspar and a fired mix consisting of silica, manganese carbonate, ferric oxide and boric acid. No. 2,478,645. General Electric Co.

In making an hydraulic cement composition, the step which comprises incorporating with the cement during the grinding one member selected from the group consisting of sebacic acid, its salts and alkyl esters. No. 2,478,831. Master Builders Co.

Coatings

Coating metal surfaces containing iron and aluminum and which can be coated by phosphate and fluoride solutions, which comprises subjecting the surfaces to the action of a hot aqueous solution containing dihydrogen phosphate, an oxidizing agent, fluoborate, and excess boric acid. No. 2,477,841. Parker Rust Proof Co.

Protection of a corrodible metal surface by coating with a metal selected from the group consisting of lead and alloys thereof with tin and antimony, immersing said coated surface in a solution consisting essentially of an alkali metal hydroxide, an alkali metal sulphate and an alkali metal dichromate. No. 2,478,692. National Lead Co.

Treating a metal article having an insoluble metal phosphate coating thereon by subjecting said phosphate coating to the action of an aqueous solution of a stannous salt which is water soluble and water stable, to form an insoluble tin-metal-phosphate complex having a corrosion resistance greatly exceeding the original phosphate coating. No. 2,478,954. J. N. Tuttle, Inc.

Wrinkle drying coating composition consisting of an uncooked homogeneous mixture of conjugated double-bonded oil and polyvinyl acetate resin in the form of an aqueous emulsion. No. 2,479,298. New Wrinkle, Inc.

Metal container for the preservation of food and beverages having as the interior coating the dried film of a coating composition comprising a copolymer of vinyl chloride with dimethyl fumarate, and based on a heat-hardening phenolformaldehyde resin. No. 2,479,409. E. I. du Pont de Nemours & Co.

Coating composition comprising a homogeneous blend of a fatty oil acid glyceride capable of drying to solid, continuous films, and a vinyl resin, said vinyl resin being a copolymer of vinyl chloride and haloethylene containing at least one fluorine atom. No. 2,479,410. E. I. du Pont de Nemours & Co.

Simultaneously cleaning metal surfaces from the class of iron, zinc and alloys of each and providing them with a corrosion-resistant and paint bonding film comprising treating the surface with an aqueous preparation containing both primary and secondary phosphates from the class which consists of alkali and ammonium phosphates, a water-soluble, surface-active emulsifying agent and added solid, undissolved, normal phosphate from the class consisting of ferric and aluminum phosphates. No. 2,479,423. American Chemical Paint Co.

Detergents

Lanolin product which emulsifies in water to form an oil-in-water emulsion, which comprises an alcoholysis product of lanolin and polyhydric alcohol oxyethylene ether, each base polyhydric alcohol in said ether containing no more than 6 carbon atoms per molecule, and at least 2/3 as many hydroxyl groups per molecule as carbon atoms. No. 2,478,820. Atlas Powder Co.

Dyes & Pigments

Adding cooked juice of garden huckleberry to aquious solution to determine pH by color evaluation. No. 2,471,896. James W. Ransom.

Pigment dyestuff obtained by coupling tetrazotized dianisidine with the 2:5 dimethoxy anilide of beta oxy napthoic acid. No. 2,477,661. Interchemical Corp.

Single bath chrome dyeing process using esterified azo dyes. No. 2,478,185. Ciba Ltd.

Polymethine dyes. No. 2,478,366. Eastman Kodak Co.

N,N'1-alkylenecyanine dyes. No. 2,478,367. Eastman Kodak Co.

Making lakes of azo compounds by making two water solutions, one of which is acid and the other is alkaline, said acid and alkaline solutions being made so that a mixture of them will contain a laking agent, a coupling component which is devoid of primary amine groups and a diazotizable primary aryl amine, at least one of said azo dye components having an acid lake-forming group. No. 2,478,768. E. I. du Pont de Nemours & Co.

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* *From Vol. 624, Nos. 1, 2, 3, 4.*

Company_____ Nature of Business_____ Manufacturer? ☐ Yes ☐ No
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Explosives

Recoveirng acetic acid from mixtures containing ammonium nitrate, nitric acid, acetic acid and residual nitramine explosives, which comprises heating the reaction mixtures in the presence of sulphuric acid to effect fume-off, and thereafter distilling the fumed-off reaction mixture from a residual acid containing sulfuric acid. No. 2,478,164. Honorary Advisory Council for Scientific and Industrial Research, Ottawa.

Delay fuze powders consisting of finely divided zirconium and red lead. No. 2,478,501. Imperial Chemical Industries Ltd.

Gasless powder comprising a mixture of a finely divided solid non-metallic element selected from the group consisting of sulphur, phosphorus, selenium and tellurium, a finely divided heavy metal oxide, and a finely divided metal which reacts with said non-metallic element and said heavy metal oxide upon ignition. No. 2,478,918. George C. Hale and David Hart.

Inorganic

Preparing a white rutile pigment from a hydrolysate prepared from a titanium sulfate solution which comprises roasting the hydrolysate in admixture with an alkali metal salt. No. 2,477,559. American Cyanamid Co.

Silica-zirconia catalyst having high selectivity for cracking of hydrocarbon oils in producing small quantities of coke at high gasoline yield activity levels. No. 2,477,638. Houdry Process Corp.

Preparing catalysts of improved steam stability from kaolin clay, by treating a calcined kaolin clay with water, and subsequently acid leaching the clay. No. 2,477,639. Houdry Process Corp.

In preparation of contact masses useful as catalysts from kaolin clays, the step of subjecting a kaolin clay to the action of water at 250° F. to 700° F. under pressure. No. 2,477,664. Houdry Process Corp.

In preparing gels comprising silica, the improvement which comprises preparing a silica hydrosol and adding a member of the group consisting of hydrofluoric acid and alkali metal fluorides to increase the pore diameter and reduce the particle density of the resultant gels. No. 2,477,695. Standard Oil Development Co.

Preparation of uranium trioxide in crystalline form, comprising heating an amorphous oxide of uranium in the presence of oxygen. No. 2,477,924. Sherman M. Fried and Norman R. Davidson (to U.S.A. by the United States Atomic Energy Commission).

Preparing zinc sulfide for use in a phosphorescent screen by grinding in the form of coarse grains resulting from heat treatment and dispersing the grains in a coating composition, characterized by grinding in the presence of stearic acid in solution. No. 2,478,387. Eastman Kodak Co.

Manufacture of adsorbent silica gels of high porosity and adsorptive capacity but resistant to heating which comprises precipitating hydrated silica in granular condition from an aqueous alkali metal silicate solution by agitating and acidifying the solution, flocculating by aging with agitation, repeatedly filtering and washing the filtered solids to remove dissolved salts, and drying and calcining the filtered solids by passing them through a rotating kiln in countercurrent contact with hot gases. No. 2,478,519. American Cyanamid Co.

Making dense dead burned magnesia from moist precipitated magnesium hydrate, by calcining a portion to produce chemically reactive magnesia, mixing the said magnesia, with a portion of the uncalcined moist hydrate, forming the mixture into nodules, coating the nodules, storing the coated nodules in piled masses to promote the generation of heat and allowing them to harden and dry autogenously, and finally heating and calcining the hardened nodules to produce dense dead burned magnesia. No. 2,478,593. Harbison-Walker Refractories Co.

Producing alumina of low soda content from particles of aluminum hydrate containing soda comprising calcining the particles of aluminum hydrate to remove only a part of the chemically combined water, subsequently leaching with a liquid capable of removing sodium values therefrom, thereafter calcining sufficiently that the total water is lower than the water content of the particles at the end of said first-mentioned calcination, and subsequently leaching the resulting particles with a liquid capable of removing sodium values. No. 2,478,675. Shell Development Co.

In reconcentrating a spent aqueous sulfuric acid in a heating zone enclosed by metallic surfaces subject to corrosion by said spent acid the improvement which comprises first reconcentrating a spent sulfuric acid which contains carbonaceous material that forms a thin carbonaceous coating on said metallic surfaces during the reconcentrating. No. 2,478,680. Standard Oil Development Co.

Recovering sulphate free magnesium chloride from an aqueous solution containing magnesium, potassium, chloride, and sulphate ions by evaporating water under conditions in which Langbeinite will crystallize out of solution and Kieserite will remain in solution, separating Langbeinite crystals; evaporating water from the resultant liquor and separating the Kieserite crystals which are formed; recycling the separated Kieserite crystals into the first evaporation so that the Kieserite crystals become dissolved and Langbeinite crystals are formed; mixing a potassium chloride solution with the liquor from which the Kieserite has been removed, evaporating water whereby Carnallite crystals are formed; removing the Carnallite crystals; recycling the Carnallite liquor to the first evaporation step; leaching said Carnallite crystals with cold water to dissolve magnesium chloride from the Carnallite; and evaporating the water from the magnesium chloride solution to form sulphate free magnesium chloride crystals. No. 2,479,001. International Minerals & Chemical Corp.

Catalyst prepared by calcining a composite of alumina, platinum and halogen. No. 2,479,109. Universal Oil Products Co.

Production of hydrogen peroxide by the partial oxidation of alcohols. No. 2,479,111. E. I. du Pont de Nemours & Co.

In preparation of magnesium hydroxide in a rapidly settling form from brines, the steps which consist in intermixing the brine with milk of lime to precipitate magnesium hydroxide in flocculent form, withdrawing a stream of the resulting suspension to an agitation zone, subjecting the suspension therein for at least one minute to such a degree of agitation as is produced by application of at least 0.001 horse power per gallon of contents, discharging the suspension from the agitation zone to a settling zone, and separating the settled sludge from the supernatant liquor. No. 2,479,138. Dow Chemical Co.

Fluorescent material consisting of magnesium orthotitanate and aluminum fluoride activated by manganese. No. 2,479,158. General Electric Co.

Defluorinating a phosphate rock containing silica by subjecting the rock to a silica-removing treatment, calcining without substantial fusion, and subjecting all parts to the action of water vapor during the period of calcination. No. 2,479,389. Coronet Phosphate Co.

Metals

In recovering indium from indium-bearing material by solubilizing in an acid solution, purifying the resulting solution, and subsequently recovering indium by precipitation from the purified solution, the improvement in purification which consists in reacting the acid solution with sodium hyposulphite (NaS_2O_4) thereby rendering such contaminants as copper, arsenic, selenium andtellurium amenable to removal by filtration. No. 2,477,799. American Smelting & Refining Co.

Treating ferrous metal surfaces which includes the steps of wetting the surface with muriatic acid, washing the surface with water to remove the acid, subjecting the washed surface to the action of an aqueous solution of citric acid and subsequently subjecting the surface to the action of an aqueous solution consisting substantially of citric acid and a dissolved lead salt. No. 2,477,851. Arthur Arent Labs., Inc.

Defluorinating a phosphatic material by adding aluminum phosphate, calcining, and subjecting all parts of the mixture to the action of water vapor during the period of calcination. No. 2,478,200. Coronet Phosphate Co.

In removal of sorbed gold and silver values from char, the steps which comprise, contacting char with a water-ammonia solution whereby desorption of said values from said char occurs, and separating the resulting solution. No. 2,478,652. Merrill Co.

Reduction of a solid reducible zinc compound containing agglomerating impurities by establishing a fluidized mass of a non-agglomerating solid diluent, introducing said zinc compound in comminuted form and a reducing agent, effecting reduction with causes agglomeration, removing from the bottom of said fluidized mass impurity agglomerates forming and settling through said fluidized mass during said reduction, and recovering zinc from the gaseous effluent from said fluidized mass. No. 2,478,912. American Metal Co., Ltd.

Recovering nickel from ore by reducing finely divided ore to obtain nickel in a state whereby it is soluble in a leaching solution and to obtain iron present in said ore in a state partially insoluble in said leaching solution by heating said ore in a reducing atmosphere, treating said reduced ore in an oxidizing atmosphere to obtain iron in a state substantially insoluble in said leaching solution, then further treating said reduced and oxidized ore in a reducing atmosphere to obtain nickel in a state readily soluble in said leaching solution without reduction of iron, leaching the thus-treated ore whereby nickel is obtained in solution and other elements in the ore remain largely as solids, separating the nickel-containing solution from said solids, and recovering nickel from said nickel-containing solution as an industrial product. No. 2,478,942. International Nickel Co., Inc.

Producing oxygen-free copper by melting copper in contact with carbon heated to a temperature above the melting temperature of copper and protecting the exposed surface of the resulting molten copper with a cover of finely divided carbon, and then removing the reducing gases from the deoxidized molten copper by treatment with a boron-containing agent of the group consisting of boron and boron-copper. No. 2,479,311. International Smelting and Refining Co.

Organic

Producing a high quality crude lactose comprising contacting a lactose-containing material of a class consisting of whey and skim milk with a cationic exchanger material acting in the hydrogen cycle to reduce the pH, heating to coagulate the proteins, separating the coagulated proteins, contacting the residual material with a cationic exchanger material acting in the hydrogen cycle and with an anionic exchanger material to remove salts therefrom, acidifying, and drying. No. 2,477,558. M & R Dietetic Labs., Inc.

Ribitylaminobenzenes. No. 2,477,560. Hoffmann-La Roche, Inc.

In electrolytically reducing phthalic acid to a cyclohexadiene dicarboxylic acid by forming a catholyte consisting of phthalic acid and dilute aqueous sulfuric acid, contacting said catholyte with a cathode consisting of liquid mercury, and passing an electric current through said cell, the step of selectively removing cell poisons which would reduce the efficiency of the process by withdrawing liquid mercury from said cathode during continued operation of said cell, separating cell poisons from the withdrawn mercury and returning the thus purified mercury to the cathode of the cell. No. 2,477,579. California Research Corp.

Electrolytically reducing phthalic acid to produce a cyclohexadiene dicarboxylic acid by forming a catholyte consisting of phthalic acid and dilute aqueous sulphuric acid, contacting said catholyte with a cathode consisting essentially of a body of liquid mercury in an electrolytic cell, maintaining the temperature between 60° and 100° C., and passing an electric current through said cell with said body of liquid mercury as the cathode. No. 2,477,580. California Research Corp.

Preparing 1,4-dicyano-2-butene by reacting a dihalogen addition product of 1,3-butadiene with an alkali cyanide in an aqueous acidic reaction medium. No. 2,477,597. E. I. du Pont de Nemours & Co.

Producing larger ketones which have a plurality of keto groups from small ketones which have fewer keto groups and in which the groups attached to a keto group are members of the class consisting of lower alkyl groups and lower aralkyl groups and in which in at least one of those attached groups the carbon atom directly attached to a keto group is an aprimary carbon atom carrying a hydrogen atom; which consists in treating the said smaller ketones in the absence of water with a diacyl peroxide in which at least one of the acyl groups is an alkacyl group of not more than four carbon atoms. No. 2,477,621. Eli Lilly and Co.

Recovering carbon dioxide from gases, which includes heating a sludge to evolve carbon dioxide, the solid phase of which sludge before heating consisting of potassium pentaborate octohydrate and sodium bicarbonate, the liquid phase of which sludge before heating consisting of an aqueous solution containing the radicals potassium, sodium, chloride, tetraborate, pentaborate, and bicarbonate. No. 2,477,636. American Potash & Chemical Corp.

In manufacture of 2,2-bis-(4-methoxyphenyl)-1,1,1-trichloroethane, the steps comprising mixing anisole, chloral, and sulfuric acid to form a liquid reacting system while simultaneously agitating and cooling whereby there is obtained a reaction mass composed of an organic phase consisting of the product 2,2-bis-(4-methoxyphenyl)-1,1,1-trichloroethane and unused anisole and an acid phase consisting substantially of sulfuric acid, water, and a small amount of sulfonated anisole, separating the organic phase by gravity separation, distilling the unreacted anisole from the organic phase whereby the product remains undistilled. No. 2,477,665. E. I. du Pont de Nemours & Co.

Purifying a Friedel-Crafts reaction liquor containing in dispersion Friedel-Crafts organo-metal halide complex which comprises dispersing in said liquor solid particles having adsorptive capacity and thereafter separating said particles, washing said particles with alkyl aryl sulfonate detergent solution and redispersing said washed particles in further impure Friedel-Crafts reaction liquor. No. 2,477,671. Diamond Alkali Co.

Preparation of organic nitriles which comprises introducing into a reaction vessel an organic halide of the formula RX wherein R represents an organic radical of the class consisting of allyl, isobutenyl, cinnamyl, monohaloalkyl-CH=CHCH$_2$, monocyanoalkyl-CH=CHCH$_2$—alkyl—CH-

$CH=CH_2$ and monohaloalkyl—$CHCH=CH_2$ groups, X being a member of the class consisting of chlorine and bromine, said organic halide reactant having not more than 10 carbon atoms per molecule, and a cyanide of the class consisting of hydrogen cyanide, alkali metal cyanides and alkaline earth metal cyanides, whereby an organic nitrile having a double bond between carbon atoms, one of which is singly bonded to a carbon atom attached directly to a cyano group is produced, said cyanide reactant reacting also as an acceptor for hydrogen halide. No. 2,477,672. E. I. du Pont de Nemours & Co.

Preparing 1,4-dicyano-2-butene which comprises reacting in the liquid phase a 1,4-dihalo-2-butene with hydrogen cyanide under acidic conditions. No. 2,477,674. E. I. du Pont de Nemours & Co.

Preparing a compound having the generic formula $RnSiF_{4-n}$, by contacting under anhydrous conditions fluosulfonic acid with a compound having the generic formula, $RnSi(OR')_{4-n}$, where R is a saturated acyclic hydrocarbon radical having from one to twelve carbon atoms, n is an integer from one to three and R' is a saturated acyclic hydrocarbon radical having from one to five carbon atoms. No. 2,477,704. Frank J. Sowa.

Azeotropic distillation of styrene-containing hydrocarbon fractions by adding 1-nitropropane and water. No. 2,477,715. Gulf Research & Development Co.

Substituted aminopyridine-ethylidene sulfonates. No. 2,477,731. Pyridium Corp.

α-acetoxy-diphenyl-acetic-acid-acetylamide. No. 2,477,816. Hoffmann-La Roche, Inc.

Preparing aminoalcohols of the general formula, $HO.CH_2.C(CH_3)_2.CH_2.R$, and hydrochloride salts thereof, which comprises hydrogenating, in the presence of a nickel catalyst, and in an aqueous solvent medium a hydrohalide salt of an aldehyde of the general formula, $O:CH.C(CH_3)2.CH_2.R$, R being the same in both formulae and representing a tertiary aliphatic amino radical, R being joined to the molecule through a carbon to nitrogen bonding. No. 2,477,842. Hoffmann-La Roche, Inc.

Alkyloxy benzyl pyridinium compounds. No. 2,477,850. Gordon A. Alles and Burnett B. Wisegarver.

Preparing β-nitrol sulfonates by replacing the hydroxyl group in a saturated β-nitrol alcohol with an aqueous solution of a bisulfite selected from the class which consists of water-soluble metal bisulfites, ammonium bisulfite, and N-substituted ammonium bisulfites. No. 2,477,869. Visking Corp.

Preparing salts of β-nitro-alkane sulfonic acids by reacting a primary nitroalkane, an aldehyde and an aqueous solution of a sulfite in which the cation is selected from the group consisting of alkali metal, ammonium, and substituted ammonium ions to produce the aci-salt of the desired nitroalkane sulfonate, said aldehyde being other than formaldehyde when the cation of said sulfite is ammonium, adjusting the reaction mixture with a weak acid until it has a pH of not over 7 whereby said acisalt is converted to the corresponding nitroalkane sulfonate. No. 2,477,870. Visking Corp.

Production of an N-hydrocarbon substituted urea by reacting urea with a ketone and hydrogen in the presence of a hydrogenation catalyst. No. 2,477,872. Shell Development Co.

N-hydrocarbon 3-piperidinols. No. 2,477,937. Societe Des Usines Chimiques Rhone-Poulenc.

In manufacture of amino alcohols by condensing an aldol with an aminating agent and hydrogen, the process comprising introducing a body of ammonia into a reaction vessel and maintaining the ammonia under hydrogen pressure in liquid phase in the presence of a hydrogenating catalyst, and introducing the aldol while said ammonia is maintained in liquid phase under hydrogen pressure at a temperature above the minimum temperature at which amination occurs but below the decomposition temperature of the amino alcohol to be formed. No. 2,477,943. Sharples Chemicals, Inc.

3,4-dichloro-1-(α-chloro-β-trichloroethyl)-benzene. No. 2,477,978. Ciba Ltd.

Producing a solid pentachloropropane-containing product which comprises introducing chlorine into 1,1,1,2, tetrachloropropane in liquid phase in the presence of actinic light. No. 2,478,008. Pennsylvania Salt Mfg. Co.

Stabilization of butadiene with salicylates. No. 2,478,045. Shell Development Co.

α-Amino-β,β-diethoxy-propionic acid. No. 2,478,047. Merck & Co., Inc.

Preparing a sulfanilamido-indazole having its sulfanilamido group attached to a carbon atom of the indazole ring which comprises reacting a p-acylaminobenzenesulfonyl chloride with a suitable amino-indazole and hydrolyzing the intermediately formed acylamino-benzenesulfonylamino-indazole by heating the latter with an aqueous mineral acid. No. 2,478,048. Winthrop-Stearns, Inc.

Compound selected from the class which consists of 4-methyl-5-β-hydroxyethyl-N-{[2-n-butyl-4-amino-pyrimidyl-(5)]-methyl}-thiazolium halides and hydrogen halide salts thereof. No. 2,478,049. Merck & Co., Inc.

Removing free fatty acids from a glyceride oil by forming a confined flowing stream of an intimate mixture of said glyceride oil and water discharging said stream into a vapor-separating chamber having a vacuum as a mixture of liquid glyceride oil and water and fatty acid vapors, withdrawing said vapors, condensing said vapors and recovering fatty acids, and separately withdrawing liquid glyceride oil and cooling said glyceride oil. No. 2,478,089. Refining, Uninc.

Producing acetanilide by forming a mixture containing aniline, glacial acetic acid and sodium hydrosulfite, heating to boiling and continuing boiling under refluxing conditions, while removing water formed in the reaction, whereby discoloration of the resulting acetanilide is inhibited. No. 2,478,114. Allied Chemical & Dye Corp.

4-hydroxyquinolines. No. 2,478,125. American Cyanamid Co.

Benzenesulfonylthiazoles. No. 2,478,146. American Cyanamid Co.

In production of chloral and chloral hydrate the steps comprising passing gaseous chlorine into ethanol at a temperature not exceeding 30° C. then at 50° C. and 60° C., then at 80° C. and 90° C., in the presence of light. No. 2,478,152. E. I. du Pont de Nemours & Co.

Removing carbon monoxide from an air-stream as a contaminant by contacting the air stream with an oxide of silver. No. 2,478,166. Minister of Supply in His Majesty's Government of United Kingdom of Great Britain and Northern Ireland.

Producing aliphatic fluoro compounds rich in fluorine by disproportionation comprising contacting a completely halogenated fluoro derivative of methane containing at least one halogen atom other than fluorine, with aluminum fluoride. No. 2,478,201. Allied Chemical & Dye Corp.

Production of perylene by catalytic dehydrogenation of 1,1'-dinaphthyl in the vapor-phase on a bed of palladium carbon. No. 2,478,205. Milton Orchin (to U. S. A. by the Secretary of the Interior).

Mono-nitrobutadiene prepared by contacting butadiene with nitric acid having a concentration greater than about 90%, in the liquid phase. No. 2,478,243. Union Oil Co. of California.

With most sincere wishes that you may enjoy a truly Merry Christmas and all the good fortune to make the New Year a happy one

THE RAYMOND BAG COMPANY
MIDDLETOWN, OHIO

Vapor phase process for isomerizing 1,4-dicyano-2-butene to 1,4-dicyano-1-butene by passing vapors of 1,4-dicyano-2-butene over a contact catalytic agent. No. 2,478,258. E. I. du Pont de Nemours & Co.

Preparing a (hydroxymethyl)-cyclohexanol wherein the hydroxyl and hydroxy-methyl groups are on separate carbon atoms by hydrogenating the corresponding (hydroxymethyl) phenol in the presence of a ruthenium catalyst and hydrogen. No. 2,478,261. E. I. du Pont de Nemours & Co.

Producing a mono-olefinic hydrocarbon without substantial polymerization of said olefinic hydrocarbon which comprises dehydrating an alcohol selected from the group consisting of isopropyl alcohol and monohydric alcohols containing at least 4 carbon atoms per molecule, in the presence of an aqueous solution of a hydrohalo acid. No. 2,478,270. Universal Oil Products Co.

Isomerizing 1,4-dicyano-2-butene to 1,4-dicyano-1-butene by maintaining 1,4-dicyano-2-butene at an elevated temperature in contact with catalytic amounts of an amine. No. 2,478,285. E. I. du Pont de Nemours & Co.

Purification of hydrocarbon mixtures containing olefins and diolefins by causing part of the diolefine to react with sulphur dioxide and separating the sulphone so formed, then heating the resulting hydrocarbon mixture to a temperature above 80° C. under a pressure such that the diolefine is in the liquid phase with a compound selected from the group which consist of di-esters of maleic acid and diesters of alkyl-and aryl-substituted maleic acids, and separating the unreacted hydrocarbons from the reaction mixture. No. 2,478,299. Celanese Corp. of America.

Producing partial esters of polyhydric alcohols and fatty acids from completely esterified polyhydric alcohol esters of fatty acids which comprises heating completely esterified polyhydric alcohol esters of fatty acids with polyhydric alcohol in the presence of water but in the absence of alkaline material. No. 2,478,354. Colgate-Palmolive Peet Co.

Separating valuable components from a reaction mixture consisting of HCl, HF and at least one chlorofluoroethane of the group consisting of $C_2Cl_3F_4$, $C_2Cl_4F_2$, and $C_2Cl_4F_2$ which comprises subjecting the reaction mixture to anhydrous fractional distillation to distill off the HCl as anhydrous hydrogen chloride, settling the remaining mixture until it forms a layer of substantially anhydrous hydrogen fluoride containing a minor proportion of dissolved organic products and a layer of organic products containing a small proportion of dissolved HF and then separating the layers. No. 2,478,362. Kinetic Chemicals, Inc.

Nuclear sulfonation products of fatty acid esters of hydroquinone hydroxyalkyl ethers and their salts. No. 2,478,368. Eastman Kodak Co.

Producing an ester of an acid of phosphorus by blowing an unsaturated ether, and thereafter treating the blown ether with an acid of phosphorous selected from the group consisting of phosphorous, phosphoric, pyrophosphoric and tetraphosphoric acids. No. 2,478,377. Eastman Kodak Co.

β-Lactones from unsaturated aldehydes and unsaturated ketones. No. 2,478,388. Eastman Kodak Co.

Recovering glycerine from a concentrate of a fermentation mash which comprises treating said concentrate with a propyl lactate. No. 2,478,417. Colgate-Palmolive-Peet Co.

Production of pyrrole, by contacting furan with ammonia, in the presence of a molybdenum oxide supported on alumina as the catalyst. No. 2,478,452. Socony-Vacuum Oil Co., Inc.

Production of aromatic nitriles by contacting an aromatic hydrocarbon containing at least seven and up to eleven carbon atoms per molecule, and having at least one nuclear hydrogen replaced by a univalent, aliphatic, non-acetylenic hydrocarbon radical, with ammonia, in gaseous phase, in the presence of a salt of a metal selected from the group consisting of nickel and cobalt. No. 2,478,464. Socony-Vacuum Oil Co., Inc.

Nuclear acylation of an acylatable thiophene to yield a product having an acyl radical attached to the thiophene nucleus by reacting an acylatable thiophene compound with an aliphatic carboxylic acid in the presence of phosphorus pentoxide. No. 2,478,484. Socony-Vacuum Oil Co., Inc.

In production of a hydrocarbon-substituted silicon halide by reacting silicon with a hydrocarbon halide the step of enhancing the reactivity of the silicon material by contacting with anhydrous hydrogen fluoride. No. 2,478,493. E. I. du Pont de Nemours & Co.

Oxazolone derivative, $C_{11}H_9NO_2$. No. 2,478,661. Winthrop-Stearns, Inc.

Increasing the degree of fluorination of a highly fluorinated fluorochlorohydrocarbon containing from 6 to 15 carbon atoms, obtained by fluorinating a fluorinated benzene homologue in the presence of a highly chlorinated solvent, by heating with a dehydrochlorinating agent, and reacting the resulting unsaturated body with a fluorinating agent selected from the group consisting of fluorine, cobalt trifluoride and silver difluoride. No. 2,478,666. Imperial Chemical Industries, Ltd.

Producing chloral by maintaining bodies of liquid in a series of reaction vessels by passing alcohol and a chlorination catalyst continuously into one end of said series, passing an excess of chlorine through said bodies of liquid in counter-current to the flow of the alcohol and catalyst, adding water to one of the last reaction vessels, acidulating the liquid reaction products to decompose the resulting chloral alcoholate and hydrate, thereby forming chloral, and recovering the chloral. No. 2,478,741. Graver Tank & Mfg. Co., Inc.

Gradually mixing in small increments a body of mineral acid water solution of a diazo component, devoid of water solubilizing acid groups, and a body of an alkaline water solution containing a diazotizing agent and a coupling component, which is devoid of water solubilizing acid groups; the acid and the diazotizable amino compound being present in about the proportion of 2 to 2.4 parts of mineral acid to 1 part of diazotizable amino compound. No. 2,478,767. E. I. du Pont de Nemours & Co.

Producing unsaturated aliphatic aldehydes by contacting in liquid phase a normally liquid open-chain hydrocarbon containing at least two adjacent tertiary carbon atoms with an oxygen-containing gas in the presence of nitrobenzene. No. 2,478,776. Phillips Petroleum Co.

Condensing an acetamidomalonic ester in the presence of sodium alcoholate with benzyl chloride, and recovering benzyl acetamidomalonic ester. No. 2,478,788. Merck & Co., Inc.

Treating o-biphenylisocyanate with a Friedel-Crafts type catalyst and recovering phenanthridone. No. 2,478,805. Monsanto Chemical Co.

In preparing 3-chlorocoumarin, the steps of dissolving coumarin in a chlorethane having from 4 to 5 chlorine atoms in the molecule, passing chlorine into said solution to convert the coumarin into chlorocoumarins and evaporating off the solvent and chlorination products thereof. No. 2,478,824. Harshaw Chemical Co.

Preparing the disodium salt of 2 carboxy-phenyl-sulphuric acid, by reacting chlorosulphonic acid with dimethylaniline, treating the dimethylaniline chlorosulphonate with a lower alkylsalicylate in the presence of sufficient dimethylaniline to take up the liberated hydrochloric acid and reacting therewith sodium hydroxide in alcoholic medium to precipitate sodium chloride and saponify the alkyl salicylsulphate. No. 2,478,834. Societe Generale d'Applications Therapeutiques "Theraplix."

Metallating a malonic ester, $R \cdot CH(CO_2Y) \cdot CO_2X$, where R is selected from the group consisting of hydrogen, aromatic hydrocarbon radicals and saturated aliphatic hydrocarbon radicals, and X and Y are alkyl radicals, which comprises reacting the ester with an anhydrous alcoholate of a metal selected from the group consisting of sodium, potassium and magnesium in a reaction medium consisting of a dialkyl carbonate. No. 2,478,853. Mallinckrodt Chemical Works.

Water-soluble ethenoxy condensation products of water-insoluble aliphatic acylcarbamylguanidines. No. 2,478,859. American Cyanamid Co.

Alkylene oxide condensation products of aliphatic acyl guanylureas. No. 2,478,871. American Cyanamid Co.

In preparation of hydrogen cyanide by reacting hydrocarbons, ammonia, and oxygen on a catalyst, the improvements which comprise effecting the reaction with hydrocarbons from natural gas which has been stripped of hydrocarbons of more than two carbon atoms and which does not contain more than 7.5% of ethane, mixing the said hydrocarbons with air and ammonia and passing the resulting mixture over a catalyst. No. 2,478,875. Rohm & Haas Co.

Alkylating an aromatic hydrocarbon with an olefine in the presence of a phosphorous acid catalyst at a temperature sufficiently high to set free acid vapors from the catalyst, passing the conversion products with the acid vapors while hot through an adsorbent bed of granular calcined alkaline earth carbonate to selectively remove the acid vapors. No. 2,478,897. Koppers Co., Inc.

Rendering non-corrosive the products resulting from the catalytic alkylation of an aromatic hydrocarbon in the presence of phosphorus acid reacting catalysts comprising: heating the aromatic hydrocarbon with an olefine in the presence of phosphorus acid reacting catalysts at a temperature at which acid vapors are released and passing the conversion vapors with the acid contaminant in contact with a solid adsorbent composed of more than 75% silica and the remainder alumina to selectively remove the acid vapor contaminant. No. 2,478,900. Koppers Co., Inc.

Separating 2-carboxy-1,2'-dianthrimide from insoluble impurities by forming an aqueous solution of the potassium salt of the carboxy-dianthrimide, separating the aqueous solution of the potassium salt from insoluble impurities, and limiting the time durng which aqueous solution is at a temperature above 90°C. to a maximum of 15 minutes, until completion of the separation. No. 2,478,910. Allied Chemical & Dye Corp.

Production of benzothiophenes by contacting a styrene hydrocarbon having a hydrogen atom attached to the nucleus in the ortho position with respect to the olefinic side chain in admixture with a hydrogen sulfide with a dehydrogenation catalyst. No. 2,478,914. Shell Development Co.

Heating 1,1,1-difluorochloroethane in the presence of an aluminum fluoride catalytic material to produce 1,1,1-trifluoroethane. No. 2,478,932. Allied Chemical & Dye Corp.

Subjecting a compound selected from the group consisting of CH_3CClF_2 **and** $CH_2ClCClF_2$ to temperature not less than 200° C. and not more than 400° C., in the presence of an aluminum oxide reagent to produce 1,1-chlorofluoroethylenes. No. 2,478,933. Allied Chemical & Dye Corp.

In manufacturing 2-carboxy-1,2'-dianthrimide by condensing a mono-amino-anthaquinone with a monochloro-anthraquinone, one of said anthraquinones having a single carboxyl group as a substituent in the 2-position and the other having no other substituent, and one of said chloro and amino substituents being in the 1-position of its anthraquinone nucleus and the other being in the 2-position of its anthraquinone nucleus, the improvement which comprises carrying out the condensation at a temperature above 140° C., but not exceeding 210° C., with the aid of a metal halide condensing agent of the Friedel and Crafts type as condensing agent. No. 2,478,959. Allied Chemical & Dye Corp.

Reaction of podocarpic acid and certain halo-alkanoic acids. No. 2,478,978. G. D. Searle & Co.

Production of acrolein by mixing vinyl acetate and formaldehyde in a lower fatty acid solvent containing a strong mineral acid. No. 2,478,989. E. I. du Pont de Nemours & Co.

Production of atroponitrile by reacting phenyl acetonitrile with formaldehyde in a non-aqueous, non-reactive solvent medium and an alkaline catalyst taken from the group consisting of sodium hydroxide, potassium hydroxide, sodium alcoholate, potassium alcoholate, and quaternary ammonium bases, and pyrolyzing the resultant product. No. 2,478,990. E. I. du Pont de Nemours & Co.

Carbalkoxylation of a phenylacetic ester in an excess of dioxane as the reaction medium by adding diethyl carbonate, adding an alkali metal alcoholate, and continuously removing alcohol liberated in the process in an excess of dioxane vapor, whereby no alcohol is ever retained in the bath; and separating the ester from the residual dioxane. No. 2,478,997. Kay-Fries Chemicals, Inc.

Preparation of 5-benzylhydantoin from 5-benzalhydantoin and hydrogen without hydrogenation of the aromatic nucleus by reacting 5-benzalhydantoin with hydrogen in the presence of a caustic-activated nickel-aluminum alloy catalyst. No. 2,479,065. E. I. du Pont de Nemours & Co.

Preparation of a monoalkyl ester of terephthalic acid by heating terephthalic acid with an alkanol having from 1 to 4 carbon atoms per molecule in the liquid phase in the absence of a catalyst. No. 2,479,066. E. I. du Pont de Nemours & Co.

Production of terephthalic acid by passing air through a liquid-phase reaction mixture containing p-toluic acid and a lead acetate catalyst in an acetic acid medium. No. 2,479,067. E. I. du Pont de Nemours & Co.

Preparing 1,2-dialkoxyethylenes by heating 1,1,2-trialkoxyethanes whereby pyrolysis to 1,2-dialkoxyethylene takes place. No. 2,479,068. E. I. du Pont de Nemours & Co.

Preparing long chain fatty acid anhydrides by reacting ethylene with a carboxylic acid anhydride having at least one hydrogen atom on a carbon alpha to the carboxylic anhydride group under superatmospheric pressure in the presence of a positive halogen compound which yields alkali hypohalite when treated with an alkali hydroxide. No. 2,479,082. E. I. du Pont de Nemours & Co.

Production of an alkyl aromatic hydrocarbon, the alkyl group of which contains from about 9 to about 18 carbon atoms of relatively straight chain configuration which comprises treating an olefinic hydrocarbon fraction with sulfuric acid to remove highly branched chain olefins and polyolefins, separating acid from hydrocarbons and alkylating an aromatic hydrocarbon with the sulfuric acid treated olefinic hydrocarbon fraction. No. 2,479,120. Universal Oil Products Co.

5-crotyl-5-phenylbarbituric acid and salts thereof. No. 2,479,148. Gordon A. Alles.

1,1'-dialkyl-3,3'-alkylenebenzimidazolocyanine salts. No. 2,479,152. Eastman Kodak Co.

Selectively extracting intermediate water-soluble, detergent-type sulfonic acids from unhydrolyzed sulfuric acid sludge resulting from the treat-

ment of a hydrocarbon oil with strong sulfuric acid comprising extracting said sludge with a paraffinic solvent, removing the paraffinic solvent extract from said sludge, and extracting the sludge with an aromatic hydrocarbon solvent in the absence of added water. No. 2,479,202. Standard Oil Co.

Heating carbon monoxide and an amino compound in contact with a catalyst under a pressure above 1000 atmospheres, said amino compound being selected from the group consisting of primary aromatic amines having at least two of the positions ortho and para to the amino group unsubstituted and N-formyl derivatives of said amines, said catalyst being selected from the group consisting of mineral acids and salts of said acids with said amines. No. 2,479,205. Imperial Chemical Industries, Ltd.

Synthesis of carbazole from o-aminobiphenyl with alumina as tar inhibitor. No. 2,479,211. Monsanto Chemical Co.

Synthesis of carbazole from o-aminobiphenyl with metal salts as tar inhibitors. No. 2,479,212. Monsanto Chemical Co.

Cyclic dihydropyran and tetrahydropyran derivatives. No. 2,479,283. Shell Development Co.

Preparing a dihydropyran carboxaldehyde by passing liquid acrolein containing hydroquinone through an elongated reaction zone, recovering unreacted acrolein and the dihydropyran carboxaldehyde and recycling the unreacted acrolein. No. 2,479,284. Shell Development Co.

Preparing organo-silicon compounds by effecting reaction in the liquid phase in the presence of a peroxy catalyst for the reaction between a compound of the general formula $(Z)mSi(R)n(X)_{4-m-n}$ where Z is a member of the class consisting of the vinyl and allyl radicals, R is a monovalent hydrocarbon radical free of olefinic unsaturation, X is a halogen, m is an integer equal to from 1 to 4, and n is one of the following: 0,1,2 and 3, and a silicon compound containing at least one hydrogen and one halogen attached directly to the silicon atom, the remaining valences of the silicon atom being satisfied by substituents selected from the class consisting of hydrogen, alkyl radicals, aryl radicals, aralkyl radicals, and halogens. No. 2,479,374. General Electric Co.

An acidic, phosphorus-, sulfur- and nitrogen-containing reaction product obtained by reacting a phosphorus sulfide and a phosphorus amine of a hydroxyaromatic compound, said product being characterized in that the phosphorus amine group thereof is linked to carbon through oxygen. No. 2,479,407. Socony Vacuum Oil Co., Inc.

Heating 2-hydroxy-3-carboxyl-pyrazine and recovering the 2-hydroxy pyrazine thus formed. No. 2,479,442. Merck & Co., Inc.

Preparing 2-amino-3-carboxy quinoxaline from alloxazine by heating with concentrated aqueous ammonia to produce the amonium salt of 2-amino-3-carboxy quinoxaline, adjusting the pH to form 2-amino-3-carboxy quinoxaline, cooling to crystallize 2-amino-3-carboxy quinoxaline and recovering by filtration. No. 2,479,443. Merck & Co., Inc.

Phthalocyanine compound selected from the group consisting of metal phthalocyanines and metal-free phthalocyanines, and characterized by bearing in at least one of the phenylene nuclei of the fundamental phthalocyanine complex a pendent aryl radical selected from the group consisting of nitroaryl and amino aryl, said pendent aryl radical being attached to said phenylene radical through a diatomic bridging link. No. 2,479,491. Imperial Chemical Industries, Ltd.

Preparation of 1,2-disubstituted-3-cyanoguanidines by reacting a carbodimide having the following formula, R—N=C=N—R′, wherein R and R′ are chosen from the group consisting of hydrocarbon and haloaryl radicals, with cyanamide in an inert organic solvent, and recovering the 1,2-disubstituted-3-cyanoguanidine. No. 2,479,498. American Cyanamid Co.

Rosin esters. No. 2,479,516. Montclair Research Corp. and Ellis-Foster Co.

2-imino-3-substituted oxazolidine, said 3-substituted radical being a member selected from the group consisting of alkyl, aryl, aralkyl and cycloalkyl radicals. No. 2,479,525. American Cyanamid Co.

Making mercaptans by reacting an organic polysulfide having a symbolic formula of the group consisting of RSSR and —SSR′SSR′SSR′— where R and R′ are alkyl and alkylene radicals, respectively, with a sulfide reagent of the group consisting of alkaline sulfides and hydrosulfides in the presence of an alkaline sulfite. No. 2,479,542. Thiokol Corp.

Paper & Pulp

In bleaching vegetable fiber pulp, the improvement which comprises treating the vegetable fiber pulp with an aqueous solution containing a chlorite of a metal of the class consisting of the alkaline metals and the alkali earth metals, and a catalyst comprising a water soluble salt of a metal of the class consisting of cobalt, nickel, and manganese. No. 2,477,631. Ecusta Paper Corp.

Petroleum

Hydrocarbon dehydrogenation process using hydrogen as a process gas and carbon dioxide as a stripping medium. No. 2,477,740. Universal Oil Prods. Co.

Conversion of hydrocarbons with suspended catalyst. No. 2,477,750. Standard Oil Co.

Lubricating oil comprising a mineral lubricating oil containing an oil-soluble composition produced by subjecting the zinc salt of di-isopropyl salicylic acid in the presence of a stable hydrocarbon oil. No. 2,477,913. Shell Development Co.

Lubricant of low pour point comprising a synthetic lubricant having incorporated an ester of an alkyl-substituted phenol. No. 23,140. Socony-Vacuum Oil Co., Inc.

In dewaxing a petroleum hydrocarbon, comprising blending said hydrocarbon with a dewaxing solvent consisting of acetone, toluol and benzol, and passing the resultant mixture through a chiller, the improvement which comprises the addition to said solvent of a compound selected from the group consisting of water miscible, oil immiscible alcohols and organic acids to inhibit the formation of a hard, adherent ice on the inner surfaces of said chiller due to the freezing of water contained in the mixture under treatment. No. 2,478,456. Socony-Vacuum Oil Co., Inc.

Separating waxy constituents from an oil by admixing the oil with an oil solvent comprising an effective amount of xylene hexafluoride. No. 2,478,472. Socony-Vacuum Oil Co., Inc.

Desulfurization of light hydrocarbon mixture by contacting a stream of said mixture with at least two concentrated caustic solutions of progressively increasing alkalinity in separate contact zones, contacting said stream in a final contact zone with a caustic solution containing litharge without the addition of sulfur, separating the desulfurized hydrocarbon mixture and separating precipitated lead mercaptides in said final contact zone. No. 2,478,603. Phillips Petroleum Co.

Preparing a lubricant comprising polymerizing a polyolefin having from 6 to 14 carbon atoms per molecule, cyclicizing the polymer, chemically combining the cyclicized polymer with a phosphorus halide and dissolving the cyclicized chemically combined phosphorus compound containing polymer in a mineral base oil lubricating material. No. 2,478,694. Standard Oil Development Co.

Stabilizing hydrocarbons against oxidation and polymerization with a liquid mixture consisting of a naphthol and an alkyl catechol. No. 2,478,710. Standard Oil Development Co.

Mineral oil composition containing an oil-soluble polymerization product of ar-cyclohexylstyrene in amount sufficient to increase the viscosity of said oil. No. 2,478,843. Monsanto Chemical Co.

Reactivation of catalysts in hydrocarbon synthesis by introducing the deactivated catalyst into direct contact of a stream of hydrogen to regenerate the activity. No. 2,478,899. Koppers Co., Inc.

Reforming a gasoline fraction by subjecting said fraction to contact with a catalyst consisting of a cracking component and a metal from the group consisting of platinum and palladium, said cracking component comprising silica and at least one metal oxide from the group consisting of alumina, zirconia, magnesia and thoria. No. 2,478,916. Universal Oil Products Co.

Reforming a gasoline fraction by subjecting said fraction to contact at reforming conditions with a catalyst comprising alumina, platinum and combined halogen. No. 2,479,110. Universal Oil Products Co.

In extraction of sulfur-containing hydrocarbon oils with hydrofluoric acid the method of preventing the formation of free sulfur during the extraction which comprises removing oxygen from the oil prior to the hydrofluoric acid extraction. No. 2,479,238. California Research Corp.

Motor fuel consisting of a lead alkyl anti-knock agent and a predominant amount of a hydrocarbon base stock consisting of a hydrogenated copolymer of a normal olefin having from 2 to 6 carbon atoms and an isoolefin having 4 to 5 carbon atoms, said fuel being stabilized against deterioration during storage by a small amount of an inhibitor selected from the class consisting of hydroxy benzoic acid and esters and salts thereof. No. 2,479,326. Standard Oil Development Co.

Alkylation of isoparaffins with olefins in the presence of sulfuric acid. No. 2,479,366. Standard Oil Development Co.

Synthesizing hydrocarbons and oxygenated hydrocarbons by forcing a mixture of gases containing carbon monoxide and hydrogen into a reaction zone containing a well-fluidized bed of powdered iron catalyst, withdrawing iron from the reaction zone, quenching, heating to incipient fusion in the presence of an oxidizing gas whereby agglomeration of the catalyst particles occurs, grinding and returning the ground iron to said reaction zone. No. 2,479,420. Standard Oil Development Co.

Producing reduced powdered catalysts of highest utility for the synthesis of hydrocarbons from carbon monoxide and hydrogen by subjecting in a reduction zone finely divided solid oxygen compounds of ferro-magnetic iron group metals suspended in a reducing gas to reducing conditions to cause substantial but incomplete reduction and insufficient to cause excessive sintering, passing a suspension of the total solid product through a magnetic separation zone, precipitating in said magnetic separation zone at least one fraction of solids, recovering said fraction, subjecting the residual suspension to a gas-solids separation in a gas-solids separation zone, subjecting solids separated in said gas-solids separation zone to a renewed reduction followed by said magnetic precipitation, and repeating the cycle. No. 2,479,435. Standard Oil Development Co.

Hydrocarbon synthesis process which comprises reacting together hydrogen and carbon monoxide in the presence of an unpromoted powdered iron catalyst in the form of a fluidized bed, adding an alkali metal compound to the reaction zone to cause a slow and homogeneous impregnation of said alkali metal compound within said catalyst, and to the extent that the desired yields of normally liquid hydrocarbons are obtained from the reaction zone, whereupon the feeding of the alkali metal compound is discontinued, and adding water to the reaction zone to repress carbon formation. No. 2,479,439. Standard Oil Development Co.

Mineral lubricating oil containing an hydroxydibenzothiophene to improve the stability. No. 2,479,513. Socony-Vacuum Oil Co., Inc.

Photographic

Photographic silver halide emulsion selected from the group consisting of silver chlorobromide, silver bromide and silver bromiodide emulsions spectrally sensitized with a sensitizing cyanine dye and containing, as a supersensitizer a pyridine base containing on a carbon atom of the pyridine nucleus, a member selected from the group consisting of alkyl groups, alkoxyl groups, halogen atoms, acyloxyl groups, alkylmercapto groups and aryl groups of the benzene series. No. 2,478,369. Eastman Kodak Co.

Multi-layer photographic element comprising at least one gelatino silver halide emulsion containing finely-divided liquid particles of a solution of color former, p-amino dialkyl aniline color developing agent base, and a water-permeable, substantially water-insoluble, low molecular weight organic crystalloidal material having a high solvent action for the color former, the developing agent and the dye formed therefrom and being permeable to photographic processing solutions. No. 2,478,400. Eastman Kodak Co.

Polymers

Composition of matter consisting of vinylidene chloride copolymerized with vinyl chloride, and the following modifiers, 3-(2-xenoxy)-1,2-epoxy propane, ethyl phtalyl ethyl glycolate, and 4′-tertiary-butyl phenyl salicylate. No. 2,477,608. Dow Chemical Co.

Copolymer containing vinylidene chloride copolymerized with vinyl chloride, and 3-(2-xenoxy)-1, 2-epoxy propane, 4′-tertiary butyl phenyl salicylate, triethylene glycol dicaprylate, and an odorless plasticizer. No. 2,477,609. Dow Chemical Co.

Copolymer containing vinylidene chloride copolymerized with vinyl chloride, and 3-(2-xenoxy)-1,2-epoxy propane, 4′-tertiary-butyl phenyl salicylate, and dibutyl sebacate free from sebacic acid and from monobutyl sebacate. No. 2,477,610. Dow Chemical Co.

Copolymer of vinylidene chloride copolymerized with vinyl chloride, and tetrasodium pyrophosphate, dibutyl sebacate, and diphenyl mono (orthoxenyl) phosphate. No. 2,477,611. Dow Chemical Co.

Copolymer of vinylidene chloride copolymerized with vinyl chloride, and tetrasodium pyrophosphate, dibutyl sebacate, and ethyl phthalyl ethyl glycolate. No. 2,477,612. Dow Chemical Co.

Copolymer of vinylidene chloride with vinyl chloride, and tetrasodium pyrophosphate, di-isobutyl adipate, and diphenyl mono-(ortho-xenyl) phosphate. No. 2,477,613. Dow Chemical Co.

Copolymer of vinylidene chloride, vinyl chloride, tetrasodium pyrophosphate, di-isobutyl adipate, and ethyl phthalyl ethyl glycolate. No. 2,477,614. Dow Chemical Co.

Polyhydroxy benzene-formaldehyde resinous compositions. No. 2,477,641. Westinghouse Electric Corp.

Resinous material selected from the group consisting of a condensation product of resin with an unsaturated acyclic hydrocarbon. No. 2,477,654. Hercules Powder Co.

Resinous material selected from the group consisting of a condensation product of rosin with an unsaturated heterocyclic compound containing only carbon, hydrogen, and the hetero-atom. No. 2,477,655. Hercules Powder Co.

Copolymer containing vinylidene chloride, vinyl chloride, tetrasodium pyrophosphate, 4'-tertiary-butyl phenyl salicylate, and an alkyl phthalyl ethyl glycolate. No. 2,447,656. Dow Chemical Co.

Copolymer of vinylidene chloride, vinyl chloride, a compound selected from the class consisting of tribarium orthophosphate and tetrasodium pyrophosphate, and ethyl orthobenzoyl benzoate. No. 2,477,657. Dow Chemical Co.

Copolymer of vinylidene chloride, vinyl chloride, a compound selected from the class consisting of tribarium orthophosphate and tetrasodium pyrophosphate, and a compound selected from the class consisting of methyl phthalyl ethyl glycolate and ethyl phthalyl ethyl glycolate. No. 2,477,658. Dow Chemical Co.

Copolymer containing vinylidene chloride, vinyl chloride, 3-(2-xenoxy)-1,2-epoxy propane and 4'-tertiary-butyl phenyl salicylate. No. 2,477,659. Dow Chemical Co.

Plasticized composition comprising a vinyl resin and a polyalkylnaphthalene containing at least three alkyl groups and containing 8 to 10 carbon atoms in the alkyl groups. No. 2,477,717. Pan American Refining Corp.

In a method wherein a monovinyl aromatic compound of the benzene series, is subjected to a polymerization reaction while dispersed in an aqueous emulsion and which contains a peroxide, the improvement which consists in dispersing in the emulsion, prior to completion of the polymerization reaction, a minor amount of a chromium compound containing chromium as a positive ion. No. 2,477,784. Dow Chemical Co.

Unsaturated liquid ester capable of curing under heat comprising the reaction product of pentaerythritel with a beta-unsaturated mono-hydric alcohol monoester of a dicarboxylic acid. No. 2,478,015. Ellis-Foster Co.

Beta-substituted ethyl-mercapto polymers. No. 2,478,038. E. I. du Pont de Nemours & Co.

Polymerizing an olefin by heating in the presence of an acidic organic nitrogen compound which derives its acidic properties solely from the nitrogen-containing group of the molecule and which decomposes under the reaction conditions. No. 2,478,066. Shell Development Co.

Producing homopolymer by heating methacrolein diacetate in the presence of about 2% benzoyl peroxide. No. 2,478,154. Shell Development Co.

Preparing a concentrated aqueous colloidal polytetrafluoroethylene dispersion by adding a surface-active agent to a dilute aqueous dispersion of polytetrafluoroethylene, flocculating the polytetrafluoroethylene by insolubilizing the surface-active agent, separating the flocculated polytetrafluoroethylene from the major portion of the aqueous phase, resolubilizing the surface-active agent and peptizing said polytetrafluoroethylene forming a dispersion containing at least 25% of colloidal polytetrafluoroethylene. No. 2,478,229. E. I. du Pont de Nemours & Co.

Polymers of n-acylaminoalkyl-acrylamide compounds. No. 2,478,378. Eastman Kodak Co.

Polymerization of polymerizable mono-olefinic hydrocarbons in the presence of saturated aliphatic esters of inorganic oxy acids of phosphorus, sulfur, and silicon. No. 2,478,390. E. I. du Pont de Nemours & Co.

Preparing a soluble, fusible polymer of crotyl methacrylate by maintaining an aqueous emulsion of monomer containing a water soluble persulfate and a water soluble compound of oxygen and sulfur in which the sulfur has a valence no greater than four as the polymerization catalyst combination and, as a dispersing agent, an alkali metal salt of an organic acid of the class consisting of alkylsulfuric acids and alkanesulfonic acids having 12 to 18 carbon chain. No. 2,478,416. E. I. du Pont de Nemours & Co.

Preparing polyvinyl alcohol by heating a mixture including anhydrous methanol and a sulfuric acid catalyst, adding solid polyvinyl acetate at a continuous and uniform rate until said reaction is complete. No. 2,478,431. E. I. du Pont de Nemours & Co.

Vinyl phosphonocarboxylate esters and polymers thereof. No. 2,478,441. E. I. du Pont de Nemours & Co.

Polymerizing a drying oil containing a minor proportion of a polymerization catalyst of the Friedel-Crafts type, arresting polymerization before gelation, by the addition of a small quantity of an aromatic monocyclic amine. No. 2,478,451. Socony-Vacuum Oil Co. ,Inc.

Maturing resinous esters by heating under vacuum a non gelatinizing rosin modified phenol formaldehyde resin in which at least 70% of the rosin is esterified by polyhydric alcohol selected from the group consisting of glycerine and pentaerythritol, the phenol being selected from the group consisting of bis phenol and paratertiary alkyl phenols. No. 2,478,490. William Krumbhaar.

Interpolymer of vinyl benzylidene diacetate and vinyl acetate. No. 2,478,495. E. I. du Pont de Nemours & Co.

Copolymers of vinyl acetate, vinyl benzoate, and an alkyl acrylate. No. 2,478,627. Monsanto Chemical Co.

Molding powder of phenol-acetaldehyde resin containing manilkara wood flour. No. 2,478,634. Monsanto Chemical Co .

Plastic bitumen-like material of very low temperature sensitivity and flow capacity constituted by a mixture of coal tar pitch with commercial anthracene paste. No. 2,478,654. Louvroil-Montbard-Aulnoye.

Copolymer of vinyl furane and vinylidene chloride. No. 2,478,860. Wingfoot Corp.

Vinyl halide resin resistant to discoloration upon heating comprising a copolymer of a vinyl halide and a dialkyl ester of butenedioic acid, the copolymer containing an alkali metal monosulfide. No. 2,478,862. Wingfoot Corp.

Porous resinous product containing dispersed bubbles of a fixed gas, comprising a blend of a copolymer of vinyl chloride and a dialkyl ester of a butenedioic acid and vinyl chloride copolymer of a polyvinyl acetal resin. No. 2,478,879. Wingfoot Corp.

Copolymer phenolic adhesive containing the intercondensation product of a monohydric phenol and a polyhydric phenol. No. 2,478,943. Koppers Co., Inc.

Thermosetting molding composition comprising a condensation product of formaldehyde and melamine, and a plasticizer which is a polyester resin containing unesterified hydroxyl groups and which is obtained by reaction of ingredients consisting of glycerol and a reactant selected from the group consisting of phthalic anhydride, adipic acid and sebacic acid. No. 2,479,090. American Cyanamid Co.

Copolymers of vinyl esters and dioxolane. No. 2,479,146. E. I. du Pont de Nemours & Co.

Emulsion polymerization of unsaturated organic compounds in the presence of an alkali metal salt of dehydrogenated tall oil as emulsifying agent. No. 2,479,226. Hercules Powder Co.

Utilizing raw citrus pulp, raw pineapple pulp, raw pineapple leaves, and raw pineapple hulls by comminuting and mixing with liquid phenol formaldehyde resin. No. 2,479,270. Oscar W. Schroeder.

Copolymers of styrene with furan or monoalkyl furan. No. 2,479,306. E. I. du Pont de Nemours & Co.

Preparing solid polymerization products by continuously introducing reaction mixture containing isobutylene and a conjugated diolefin of from 4 to 6 carbon atoms per molecule, an inert liquid diluent and a Friedel-Crafts catalyst into a reaction vessel, at a temperature between 0° C. and —160° C. thereby forming a slurry of solid polymer particles in reaction liquid. No. 2,479,360. Standard Oil Development Co.

Obtaining a tetrafluoroethylene/ethylene interpolymer by subjecting a mixture of tetrafluoroethylene and ethylene to the action of a water-soluble salt of an inorganic peracid. No. 2,479,367. E. I. du Pont de Nemours & Co.

Polymerizing a mixture of anhydrous isobutylene, a diolefin having 4 to 5 carbon atoms and an alkyl halide in the presence of a Friedel-Crafts catalyst. No. 2,479,418. Standard Oil Development Co.

Resinous condensation product of an aldehyde and 3,5-diamino-4-dihydrothiadiazine-1-dioxide. No. 2,479,441. Monsanto Chemical Co.

Preparing a solid, plastic, non-hydrocarbon interpolymer, comprising reacting isobutylene, a multi-olefin having from 4 to 10 inclusive carbon atoms per molecule, and a chlorinated styrene having 1 to 2 chlorine atoms on the ring, in the presence of a polymerization catalyst comprising a Friedel-Crafts active metal halide catalyst in solution in a low-freezing non-complex-forming solvent. No. 2,479,459. Standard Oil Development Co.

Resinous cationic surface active material obtained by condensing a saturated fatty acid containing at least four carbon atoms with a water-soluble thermoplastic amine resin, said resin being a condensation product of equimolar proportions of epichlorohydrin and tetraethylenepentamine. No. 2,479,480. American Cyanamid Co.

Copolymer of styrene, a compound of a class consisting of alpha beta ethylenically unsaturated alpha beta dicarboxylic acids and the anhydrides thereof and a polyester of an alcohol of a class consisting of alkane diols and the dihydric ethers thereof and endomethylene Δ 4 tetrahydrophthalic anhydride. No. 2,479,486. Pittsburgh Plate Glass Co.

Film of polyvinyl acetaldehyde containing a cupric salt of the group consisting of cupric halides and cupric nitrate and ethyl silicate. No. 2,479,501. Mortimer Marks.

Resinous composition of matter consisting of a copolymer of maleic anhydride and a neutral polymerizable polycarboxylic ester selected from the group consisting of diallyl oxalate, diallyl malonate, diallyl succinate, diallyl phthalate, diallyl diglycolate, triallyl citrate, glycol bis (allyl phthalate), bis (alpha-carballyloxyethyl) carbonate, ethylene glycol bis (alpha-carballyloxy ethyl carbonic acid ester), ethylene glycol bis (allyl carbonic acid ester), diethylene-glycol bis (allyl carbonic acid ester), bis (2-carballyloxy-aminoethyl) carbonate, and 2-carballyloxyaminoethyl allyl carbonate. No. 2,479,522. Pittsburgh Plate Glass Co.

Processes & Methods

Article of manufacture adapted for use in chemical reactions as a catalyst, absorbent and the like and which comprises granular polytetrafluoroethylene and another finely divided solid material compressed into a pellet. No. 2,479,451. E. I. du Pont de Nemours & Co.

Rubber

Reclaiming a vulcanized rubbery polymer of a conjugated diolefinic compound, which comprises subjecting said polymer to friction in the presence of a catalyst consisting of a mixture of a water-insoluble aliphatic amine and a phosphoric acid. No. 2,477,809. General Tire & Rubber Co.

Vulcanizing butadiene copolymer rubbers of the class consisting of copolymers of 1,3-butadiene and styrene and the copolymers of 1,3-butadiene and acrylenitrile and in the absence of sulfur which comprises incorporating in the unvulcanized copolymer an aliphatic hydrocarbon compound containing not more than 15 carbon atoms and at least one—CX_3 group in which X represents a halogen of the group consisting of chlorine, bromine and iodine, and a metal oxide of the group consisting of magnesia, zinc oxide and litharge, and heating. No. 2,478,036. E. I. du Pont de Nemours & Co.

Producing copolymers containing 2-chloro-1,3-butadiene and 1,3-diene hydrocarbon of the group consisting of 1,3-butadiene and isoprene having improved stability against deterioration due to aging, by incorporating a compound of the class consisting of $(R,R_1N—C_6H_4)_2$-X in which X stands for a divalent radical of the group—CO—, —CHOH—, —CH_2—, —CHC_6H_5— and —$CHC_6H_4N(CH_3)_2$—, R stands for a radical of the group consisting of methyl, ethyl and benzyl radicals and R' stands for a radical of the group consisting of methyl and ethyl radicals, and those of said formula wherein not more than two of the hydrogens of the benzene radicals are replaced by a substituent of the group consisting of alkyl groups containing not more than 2 carbon atoms, halogen, and sulfo radical. No. 2,478,737. E. I. du Pont de Nemours & Co.

In effecting emulsion polymerization of a monomer mixture consisting of 2-chloro-1,3-butadiene and 1,3-butadiene hydrocarbon in which the polymerization is carried out under acid conditions, the step which comprises effecting the polymerization in the presence of tetraalkyl-p,p'-diamino-diphenyl methane in which each of the alkyl groups contains from 1 to 4 carbon atoms. No. 2,478,738. E. I. du Pont de Nemours & Co.

In reclaiming a vulcanized, rubber-like, synthetic material selected from the group consisting of polymerized chlorobutadiene and copolymers of butadiene and acrylonitrile, the step which comprises mixing with said vulcanized rubber-like material phenyl-beta-naphthylamine and then softening by heating. No. 2,478,826. Wingfoot Corp.

Reclaiming a vulcanized rubber-like butadiene-styrene copolymer which comprises devulcanizing the copolymer by treatment with alkali and then masticating the devulcanized copolymer with an acidic metal salt of an inorganic acid selected from the group consisting of aluminum and zinc salts. No. 2,478,827. Wingfoot Corp.

Butadiene 1,3-acrylonitrile rubbery copolymers including di-p-isobutyl sebacate. No. 2,479,018. Kay-Fries Chemicals, Inc.

Synthetic rubbery reaction products by reacting a butadiene hydrocarbon while heating it with a saturated organic compound of the formula $R\text{-}CH_2\text{-}R'$, in an aqueous medium containing an emulsifying agent and a peroxide compound, R and R' being electro-negative radicals selected from the group consisting of CN, COO-alkyl and $COCH_3$. No. 2,479,490. Les Usines de Melle (Societe Anomyme).

Specialties

Adhesive paste consisting of water, a solid amlaceous substance having

adhesive properties, and a water-soluble salt of alginic acid. No. 2,477,912. Kelco Co.

Water-repellent lithographic developing ink incapable of firm drying, comprising an oily liquid of substantially non-drying fatty material and thinner, with the addition of colloidal metal from the class having a valence of 2 and consisting of copper, lead and iron. No. 2,478,070. Harris-Seybold-Potter Co.

Bituminous composition comprising an asphalt, sulfur and an oleophilic aliphatic mono-amine having 12 to 24 carbon atoms. No. 2,478,162. Shell Development Co.

Composition for removing decalcomanias comprising acetone; ethyl acetate; methyl acetate; and water. No. 2,478,319. George R. Raub, Sr., and George R. Raub, Jr.

Production of colored smokes for signals, containing in solid admixture a combustible agent and an oxidizing agent which, upon ignition, furnish heat and gases for volatilizing and dispersing the color component, said composition containing in substantial proportion and as the active blue color component and alkylated amino anthraquinone. No. 2,478,418. John W. Orelup.

Composition for the production of colored smokes, containing as the active yellow color component a quinoline yellow base. No. 2,478,419. John W. Orelup.

Inhibiting the corrosion of metals in polymetallic systems when in contact with an aqueous system, by adding a corrosion inhibitor which comprises: a chromium containing salt selected from the group which consists of the alkali metal chromates and a mixture of the alkali metal dichromates and the alkali metal carbonates; an organic compound selected from the group which consists of benzoic acid and salts of benzoic acid; and hexamethylenetetramine. No. 2,478,755. Merck & Co., Inc.

Inhibiting the corrosion of metals in polymetallic systems when in contact with an aqueous system, by adding a corrosion inhibitor consisting of: a chromium containing salt selected from the group consisting of the alkali metal chromates and the alkali metal dichromates; an organic acid selected from the group consisting of benzoic acid and succinic acid; 2-methyl, 2-amino-propanol-1; and alkali. No. 2,478,756. Merck & Co., Inc.

Brazing flux containing $K_2B_4O_7.5H_2O$, KHF_2, KBF_4, and H_3BO_3. No. 2,478,944. Albert E. Rising, Jr.

Composition for examination under visible light of metal surfaces and the like for flaws, consisting of a penetrating mineral oil, an emulsifier for said oil, and a light-reflecting dyestuff which will leave a visible indication in said flaws. No. 2,478,951. California Research Corp.

Improving the foam of fermented malt beverages with propylene glycol alginate. No. 2,478,988. Wallerstein Co., Inc.

Adhesive containing chlorinated terphenyls, polystyrene, hydrogenated terphenyls, and volatile organic solvent. No. 2,479,130. Monsanto Chemical Co.

Inhibiting deterioration of cellulosic material in contact with an air-blown asphalt containing residua of air-blowing oxidation catalysts selected from the group consisting of chlorides, sulfates and carbonates of zinc, iron, copper and antimony which comprises incorporating an oil-soluble lead soap. No. 2,479,235. California Research Corp.

Water emulsion comprising oily materials in emulsified form, a normally liquid chlorinated paraffin hydrocarbon containing 25 carbon atoms per molecule and between about 10% and about 70% of combined chlorine, an emulsifying agent, and ammonium thioglycollate with excess ammonia. No. 2,479,382. Samuel O. Ronk and Louise R. Hunter.

Rust inhibiting lubricating composition consisting of mineral lubricating oil containing sorbitan mono-stearate and an organic solubilizer and wetting agent for completely dissolving said stearate in said oil, said solubilizer being selected from the class which consists of at least one of the compounds sorbitan mono-oleate and pentaerythritol mono-oleate. No. 2,479,424. Standard Oil Development Co.

Making an absorbent material having a porous character, by mixing lime, caustic soda solution, and cuprammonium solution to produce a mixture having the consistency of a very stiff mortar, and heating the mortar-like mass to dry and to decompose the cuprammonium solution with formation of free ammonia and cupric oxide, and to remove substantially all free water, leaving the lime as calcium hydroxide, and reducing the mass to a granular condition. No. 2,479,520. Willson Products, Inc.

Textiles

Improving textile material by treating said textile material with a composition including stearamidomethylene orthosilicate, and thereafter heating whereby said improved textile material exhibits water repellent properties fast to commercial cleaning methods. No. 2,477,779. Sun Chemical Corp.

Production of translucent textile material by impregnating fabric with a hydrophobe film-forming material, said fabric being of regenerated cellulose filaments made by stretching cellulose ester filaments in a softened condition and saponifying them completely, by wetting the fabric with water and subjecting it while moist to the action of a hydrophobe organic liquid immiscible with water selected from the group consisting of benzene, toluene, xylene, solvent naphtha, light fractions of petroleum, carbon tetrachloride, perchloroethylene and methyl cyclohexanol until the fabric has a substantially uniform appearance, and thereafter impregnating the fabric with a hydrophobe liquid capable of yielding a transparent film on drying, and causing the latter liquid to dry. No. 2,478,974. Celanese Corp. of America.

Imparting sheerness and uniformity of appearance to hosiery of textile filaments made by stretching cellulose ester filaments while in a softened condition and saponifying, which comprises wetting the hosiery with an aqueous liquid and subjecting it while moist with water, to the action of a hydrophobe organic liquid selected from the group consisting of benzene, toluene, xylene, solvent naphtha, light fractions of petroleum, carbon tetrachloride, perchloroethylene and methylcyclohexanol until it appears clear therein and then impregnating it with a drying oil and causing the latter to dry without closing the interstitches in said hosiery. No. 2,478,975. Celanese Corp. of America.

Producing rayon filaments by projecting a ripened viscose solution into a spinning bath containing zinc sulfate and sulfuric acid. No. 2,479,218. Canadian International Paper Co.

*Agricultural**

Method of pest control by subjecting organic material subject to infestation to the action of a dialkyl ester of α,β-dichlorosuccinic acid in which the alkyl groups each contain not more than 4 carbon atoms. No. 2,480,010. Allied Chemical & Dye Corp.

Preparation of polychlorophenoxyacetic acids useful as plant growth regulators by reacting an alkali metal salt of a polychlorophenol and an alkali metal salt of chloroacetic acid in water and a substantially water-insoluble inert organic liquid which is a solvent for said polychlorophenol and which is selected from the group consisting of hydrocarbons and halogenated hydrocarbons. No. 2,480,817. United States Rubber Co.

Dust composition useful as a seed disinfectant comprising N(ethyl mercury)-p-toluene sulfonanilide in admixture with a finely divided inert powder. No. 2,481,438. E. I. du Pont de Nemours & Co.

*Cellulose**

Purifying freshly formed viscose cellulose filamentary materials by subjecting the materials, while in a gel state and while still containing adherent acid from the coagulating bath, to washing treatments with an aqueous solution containing sodium hexametaphosphate and then with an aqueous solution of sodium hexametaphosphate and a compound selected from the group consisting of alkali-metal chlorites, chlorine dioxide and chlorous acid. No. 2,479,605. Celanese Corp. of America.

Manufacturing nitro-cellulose powder composition free of air bubbles or fissures due to occluded gas which comprises working the composition in an atmosphere of CO_2. No. 2,479,727. U. S. A. as represented by Secretary of War.

Aqueous solution of a water-soluble cellulose ether selected from the class consisting of the water-soluble alkyl celluloses and the water-soluble hydroxyalkyl celluloses and, as a thickening agent a water-soluble salt of alignic acid. No. 2,480,949. Carbide and Carbon Chemicals Corp.

Cellulosic product consisting of cotton as a raw material for conversion into rayon having incorporated an added cation-active amino compound selected from the group consisting of an alkyl amine having from 7 to 18 carbon atoms, an alkyl alkanolamine having at least one alkyl radical having from 8 to 14 carbon atoms and having from 14 to 18 total carbon atoms, a lauryl ether of an alkanolamine, lauryl piperidine, lauryl methyl cyclohexylamine, an acylated polyethylene polyamine in which the acyl radical has from 7 to 18 carbon atoms, an acylated hydroxy-ethyl polyethylene polyamine in which the acyl radical has from 7 to 18 carbon atoms, an alkyl imidazoline having an alkyl radical having from 7 to 18 carbon atoms and an alkyl guanidine having an alkyl radical having from 7 to 18 carbon atoms. No. 2,481,692. Rayonier, Inc.

A cellulosic product consisting of cotton as a raw material for conversion into rayon having incorporated an added polyalkylene oxide polymerization compound selected from the group consisting of a polyalkylene oxide and a mixed ether having attached to the ether oxygen a polyalkylene oxide radical and a hydrocarbon radical containing more than 7 carbon atoms. No. 2,481,693. Rayonier, Inc.

Production of a range of acetone-insoluble cyanoethyl ethers of cellulose by mixing viscose containing caustic soda and acrylonitrile. No. 2,482,011. Courtaulds Ltd.

In making a degraded oxycellulose which is soluble by refrigeration in aqueous alkalies to yield solutions capable of forming continuous coherent films, the steps of impregnating cellulose with a 20% sodium hydroxide solution containing hydrogen peroxide, permitting the cellulose to remain in the impregnating bath for 5 hours, then pressing the cellulose to an increase of 230% and permitting it to stand at about 25° C. for 96 hours to produce an activated soda cellulose, mixing said activated soda cellulose with 20% sodium hydroxide and crushed ice to produce a clear solution. No. 2,482,042. Montclair Research Corp.

*Ceramics**

Refractory comprising a fused admixture containing aluminum nitride, a binder selected from the group consisting of calcium fluoride and cryolite, with the remainder consisting of carbon and aluminiferous material selected from the group consisting of aluminum oxide, aluminum carbide and aluminum. No. 2,480,473. Reynolds Metals Co.

Refractory comprising a vitrified composition of aluminum nitride, and alumina and a compound of the group consisting of zirconia and silica. No. 2,480,475. Reynolds Metals Co.

Refractory material consisting of refractory aggregates, and a bond therefor comprising the reaction product of a sodium silicate soluble glass and a sodium X fluoride wherein X is a member of the group consisting of silicon and titanium. No. 2,480,577. Robinson Clay Product Co.

Optical fluophosphate glass consisting of the system $AF\text{-}MF_2\text{-}R$, where AF indicated fluoride selected from the group consisting of the fluorides of lithium, potassium, and sodium, MF_2 indicates fluoride selected from the group consisting of the fluorides of magnesium, calcium, strontium, barium, and zinc and R represents phosphate selected from the group consisting of the phosphates of aluminum and beryllium. No. 2,481,700. Eastman Kodak Co.

Optical glass resulting from fusion of a batch comprising alkali metal fluoride chosen from the group consisting of the fluoride of sodium, the fluoride of potassium, and a mixture of the fluorides of sodium and potassium; oxide chosen from the group consisting of the oxide of titanium, the oxide of columbium, and a mixture of the oxides of titanium and columbium; and silica. No. 2,481,701. Eastman Kodak Co.

Electric insulator porcelain consisting of the reaction products of a mixture of talc, clay and a zirconium compound selected from the group consisting of zirconium oxide, zirconium silicate, and the barium, calcium and magnesium zirconium silicates or of a mixture of said zirconium compounds. No. 2,481,729. Lapp Insulator Co., Inc.

*Coatings**

Forming a rustproofing coating of a metallic phosphate upon a ferrous metal by subjecting said surface to the action of an aqueous solution of free phosphoric acid, a phosphate of a metal selected from the group consisting of zinc, manganese and copper, and boron phosphate. No. 2,479,564. Lloyd O. Gilbert.

Removing non-drying fatty acids from a fatty oil of the class consisting of drying and semi-drying oils, to improve the drying properties by heating the oil with a polymer of fatty acids having, before their polymerization, the same number of carbon atoms per molecule as the non-drying fatty acids and then distilling from the said oil non-drying fatty acids which have been liberated by the said polymer acids. No. 2,479,857. Emery Industries, Inc.

Anti-corrosive paint comprising a vehicle selected from the class consisting of resinous and oleaginous film forming and drying vehicles and a plumbate of an alkaline earth metal. No. 2,479,988. National Lead Co.

Powder for use as a plaster finish coating composition composed of hydrated quicklime, calcium chloride and glucose. No. 2,480,020. William Helms.

Liquid coating composition containing ethyl cellulose; a resin selected from the class consisting of those urea-formaldehyde, melamine-formaldehyde and ternary urea-melamine-formaldehyde resins; and 4,4'-isopropylidene-bis-(1-phenoxy-2-propanol). No. 2,480,349. Dow Chemical Co.

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Lead-boro-silicate enamel slip comprising a frit, and magnesium oxide as a deflocculant, said frit having incorporated therein strontium chloride. No. 2,481,473. Western Electric Co., Inc.

Lead borosilicate enamel slip comprising a lead borosilicate frit, colloidal clay, and a compound selected from the group consisting of strontium chloride and barium chloride. No. 2,481,474. Bell Telephone Labs., Inc.

Preparation of drying oil by polymerization of olefins with anhydrous hydrogen fluoride. No. 2,481,498. Phillips Petroleum Co.

Trade marks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

KLINGFAST. Lubricating greases. 443,298. Brooks Oil Co.

"Liquid Dynamite." Liquid fuels—namely, nitro-paraffins and nitro-paraffins—mixed with hydro-carbon and/or carbohydrates. 513,643. Smitherlin, Inc.

FLOOR-X. Floor cleaners. 514,303. Bengal Co.

ANTUCIDE. Rodenticide. 514,306. Ten Eyck Chemical Co.

Titekote. Cold water paint with waterproofing qualities. 514,309. Cook and Nichol.

HART'S 77. Penetrating oil. 514,316. Chemical Specialties, Inc.

KANT-LIV. Rodenticides and insecticides. 514,318. Velodent Products Mfg. Co., Inc.

(Symbol). Chemical compounds for washing and cleaning. 514,319. Climalene Co.

"ABSORBS GRIME, SAVES TIME." Soap. 514,323. French and Gilbert, Inc.

BEST EVER. Washing compound. 514,325. Atwood Mfg. Co.

Monte Carlo. Gun bore cleaning solvent. 514,401. J. L. Galef & Son, Inc.

SOILPAK. Waterproofing powder for converting sand and soil into waterproof pavement. 514,949. Service Engineering Co.

(Symbol). Chemical compositions in the form of ball briquets used in water treatment. 514,953. National Aluminate Corp.

AISTOM'S VERYBEST. Agricultural insecticides. 514,965. Guy D. Austin & Co.

Weedicide. Liquid chemical used in a solution as a spray on weeds, for the purpose of destroying said weeds. 514,966. Thompson Horticultural Chemicals Corp.

WARCOSAN. Sulfonated fatty material for processing of textiles. 515,139. Sun Chemical Corp.

Rhodes. Dry paste and ready mixed paints, varnishes and oils, used in mixing paints. 515,226. D. H. Rhodes & Co.

(Symbol). Alkaline boiler protective; liquid rust eradicator; liquid chemical fuel oil conditioner; soot remover; chemical drain pipe opener; granulated dry oil eradicator. 519,109. Wasco Engineering Corp.

Staley's. Nutrient median for mold growth such as organisms to produce penicillin and streptomycin. 519,838. A. E. Staley Mfg. Co.

PPG. Paint products. 522,385. Pittsburgh Plate Glass Co.

(Symbol). Industrial, liquid solvents for cleaning metal. 523,599. Metal-Clean Solvent Corp.

QUICK-FIX. High speed fixing solution containing ammonium thiosulfate in place of hypo. 527,504. Edwal Labs., Inc.

SQ PREPARED PAINT. 530,081. Hockaday, Inc.

CULLIGAN. Water softeners of the zeolite type. 530,625. Culligan Zeolite Co.

BROWN LABEL. Liquid polish for finishing and coating floors. 532,829. S. C. Johnson & Son, Inc.

EI-BA-CO. Household insecticide for killing roaches or waterbugs. 534,606. Ei-Ba-Co Chemical Co.

HARDLAC. Synthetic alcohol soluble varnish. 535,060. McDougall-Butler Co., Inc.

SUNOCO. Petroleum base thinner for paints and varnishes, automobile combined polish and cleaner in liquid form; automobile black tire paint; automobile wax; and automobile combined cleaner and wax. 535,193. Sun Oil Co.

The Quakers of Conshohocken, Pa., U. S. A. Synthetic organic detergents, soaps and solvent cleansers. 535,874. Quaker Chemical Prods. Corp.

CHIPPEWA CHIEF. Mixed paint. 539,838. Stewart Paint Mfg. Co.

SANAGRAN. Preparation for agricultural use as a disinfectant for the protection of seeds against cryptogamic diseases. 539,910. Societe des Usines Chimiques Rhone-Poulenc.

CHIKSAN. Lubricating oils and lubricating greases. 540,035. Chiksan Co.

PACKARD. Lubricating oil, and rust preventive oil for radiators. 540,310. Packard Motor Car Co.

ARMALITE. Casein paste paint. 540,615. Armstrong Paint & Varnish Wks.

Topper. Oil paint. 541,975. Somay Products, Inc.

Fuller. All purpose cleaner. 543,437. Fuller Brush Co.

Lady Like. Powder, paste, and liquid polishing waxes. 545,217. Baltimore Paint & Color Wks.

Lightfoot's. Compounds for cleaning the hands, detergent powder and soap. 545,497. Lightfoot Schultz Co.

CLEANALL. Preparation for cleaning velvet, silk, and satin, and kid shoes, slippers, gloves, and belts. 545,603. Whittemore Bros. Corp.

SHUCLEAN. Preparation for dressing, for cleaning and whitening white kid. 545,605. Whittemore Bros. Corp.

BOSTONIAN SHOE CREAM. Preparation for cleaning and polishing kid and calf leathers. 545,606. Whittemore Bros. Corp.

"QUICK WHITE." Preparation for dressing for shoes. 545,607. Whittemore Bros. Corp.

A A. Castor oil. 545,810. Baker Castor Oil Co.

PERMATEX. Remover of road tar and road oil, for a liquid for cleaning glass and for a cleaning fluid for clothing and upholstery. 545,879. Permatex Co., Inc.

PERMATEX. Chemical compound in powder form for automotive cooling systems for dissolving rust and scales; a chemical compound on non-corrosive lubricant for use on certain types of shock absorbers. 545,881. Permatex Co., Inc.

TRIAD. Metal cleaning solvents. 546,973. Detrex Corp.

PENNSALT HFK. Material of construction of the nature of self-hardening organic resin composition, used as a bonding cement for acid-proof brick or tile. 549,654. Pennsylvania Salt Mfg. Co.

PHOSCIDE. Parasiticides—namely, insecticides and fungicides; and herbicides. 550,385. California Spray-Chemical Corp.

HOMART. Porcelain enamel cleaner. 550,441. Sears, Roebuck and Co.

BURLINGTON. Linseed oil, turpentine, ready-mixed paints, paint enamels, enamel undercoat, stains, prepared shellac, varnishes, wall paint, paint and varnish remover, paint pigments, dryers, fillers, floor waxes, and dry colors. 550,492. Davis Paint Co.

Oceanite. Magnesium oxide powder blended for making oxychloride cement. 551,580. Permanente Metals Corp.

(Symbol). Magnesium oxide powder blended for use as an oxychloride grade magnesia cement. 551,584. Permanente Metals Corp.

GREEN BIRD PAJARO VERDE. Germicidal and fungicidal preparations. 551,989. Green Bird Ointment Co.

WERKRITE. Cleaning compound for general laundry, textile, and similar industrial uses. 552,296. M. Werk Co.

(Symbol). Chemical preparation having disinfecting and germicidal properties for opening clogged drains. 552,386. Drackett Co.

Lusol. Water soluble cutting and cooling fluid. 552,829. F. E. Anderson Oil Co.

CRUISING BOTTOM GREEN. Anti-fouling paint. 552,885. Edward Smith & Co., Inc.

FISHERMAN RED COPPER BOTTOM. Anti-fouling paint. 552,886. Edward Smith & Co., Inc.

FOODLAND. Toilet soap, laundry soap, soap chips, soap powder, powder for cleansing, scouring, and polishing. 552,944. Clover Farm Stores Corp.

ALKYUM. Vehicles for paints and varnishes comprising oil modified glycerol phthalate resin liquids. 555,139. Adco Chemical Co.

GRANO. Granulated soap product. 555,525. Jewel Tea Co., Inc.

REPTONE. Flat wall paint and paint-enamel undercoat. 556,128. Republic Paint & Varnish Co.

GOODYEAR. Automobile body polish, paint for tires and rubber goods, and touch-up enamel. 556,438. Goodyear Tire & Rubber Co.

S L. Compound to stop slow leaks in basket balls, soccer balls. 556,650. SL Fluid Co.

E-Z-EST. Liquid chemical preparation for the cleaning and polishing of silver. 556,601. E-Z-Est Products Co.

CARBIT Permanence. Ready mixed paints. 556,769. Carbit Paint Co.

FEL-TA-SHEEN. Chemical solution to be used jointly with a carrot on fur skins. 556,850. Textile Fur Products Co.

HYDROPHEN. Water soluble phenol base resins and water soluble and urea base resins. 556,915. Reichhold Chemicals, Inc.

(Symbol). Pulverulent barite for use in drilling fluid for oil wells. 557,101. Arizona Barite Co.

KLEEN FLOOR. Cleaning compound for floors and other surfaces having incidental polishing properties. 557,194. S. C. Johnson & Son, Inc.

M & C MULTI CLEAN. Floor varnish. 557,201. Multi-Clean Products, Inc.

(Symbol). Chemical compound useful as an emulsifying and dispersing agent. 557,391. Robeson Process Co.

NELIO. Gum rosin, polymerized rosin, and metal resinates. 558,133. Glidden Co.

NELIO. Turpentine. 558,134. Glidden Co.

SPOTLIGHT. Oil soap in jelly form. 558,369. Cudahy Packing Co.

LENOX. Bronze liquids, paint enamels, and ready-mixed decorative and preservative paint. 558,473. Denny, Hilborn & Rosenbach, Inc.

VICARGEM. Granular, general purpose cleanser. 558,829. Virginia-Carolina Chemical Corp.

AGRASHEL. Nut shell and fruit pit shell aggregates. 558,981. Agicide Labs., Inc.

PLASTOFIL. Nut shell and fruit pit flour as a filler for synthetic resins. 558,983. Agicide Labs., Inc.

SOVAR. Ready mixed paints, paste paints, flat wall paints, roof paints, oil enamel, varnish enamel, lacquer enamel, synthetic enamel, oil undercoater, varnish undercoater, lacquer undercoater, synthetic undercoater, oil primers, varnish primers, lacquer primers, synthetic primers, clear varnishes, flat varnishes, oil stains, varnish stains, and paint thinner. 559,062. Southern Varnish Corp.

fb. Insecticide. 559,595. Faesy & Besthoff, Inc.

Sunny South. Turpentine. 559,601. Glidden Co.

QUINTITE. Diatomaceous silica. 559,779. Colonial Chemical Co., Inc.

CDR-TEK. Shingle and roofing paint. 559,835. Co-Operative Roof Co.

THEME COLORS. Ready-mixed paints. 560,079. Keystone Varnish Co.

LUCOFLINT. Paint enamel. 560,118. John Lucas & Co., Inc.

CERALAN. Lanolin alcohols in wax form. 560,291. Robinson-Wagner Co., Inc.

HYCHOL. Lanolin containing cholesterol. 560,292. Robinson-Wagner Co., Inc.

Hiawatha. House paint and floor paint. 560,544. Chicago Paints, Inc.

DILEINE. Emulsified phenyl amine used on acetate dyes fabrics to prevent atmospheric gas fading. 560,591. Jacques Wolf & Co.

ELASTICA. Varnishes, japans, and woodstains. 561,153. Standard Varnish Wks.

SATINETTE. Paint enamels. 561,156. Standard Varnish Works.

KLONDIKE. Aluminum, gold, and bronze paints. 561,713. Baer Brothers.

META TONE. Inks. 561,777. International Industrial Sales Co.

FISCOSINE. Non-oily viscous liquids for use on dust collecting surfaces for dust retention purposes. 562,003. American Air Filter Co., Inc.

HY-O-LAN. Soap. 562,060. Hysan Products Co.

Q-neek. Liquid preparation for stopping and preventing runs in ladies' hosiery. 562,160. Brentwood Distributors.

QUAKERAL. Furfural. 562,401. Quaker Oats Co.

LAMBCO. Waterproof paste wax for cement floors. 562,642. Lambert Corp.

LAMBCO. Paints for the exterior of buildings. 562,643. Lambert Corp.

ANTAROX. Chemicals and preparations thereof—namely, surface active agents, emulsifying agents, wetting agents, and dispersing agents. 562,692. General Aniline & Film Corp.

PERDOX. Sodium perborate monohydrate. 562,921. E. I. du Pont de Nemours & Co.

FRAYSOL 22. Liquid cleaning solution for cleaning dirt and grease from machines of various kinds. 563,726. Cofray Mfg. Co., Inc.

FRAYSOLVE. Liquid rinsing solution for cleaning and rinsing dirt and grease from machines of various kinds. 563,727. Cofray Mfg. Co., Inc.

MODIPHAT. Fatty acid esters useful principally in the manufacture of paint-like compositions. 564,229. General Mills, Inc.

ANSUL. Comminuted free-flowing, fire-extinguishing dry chemical. 564,546. Ansul Chemical Co.

AZITE. Dicyanidiamide for use in paper manufacture. 564,751. American Cyanamid Co.

Laundex. Prepared liquid starch. 565,757. Delecto Products Co.

Y-POF. Hand cleaner. 565,979. Richard L. Walsh.

CIPCO. Washing compound. 566,257. Commercial and Industrial Products Co.

GLAS-MET. Glass cleaner and metal polish. 566,795. C. B. Dolge Co.

FLUDS. Soap. 567,626. Colgate-Palmolive-Peet Co.

DAZZLE. Polish for stoves, furnaces, grates, and boilers. 567,646. J. L. Prescott Co.

GOLD CHAIN. Insecticides—namely, roach powder. 568,581. Gold Chain Exterminators.

RHOTONE. Binder for use in the dyeing and printing of textiles. 574,463. Rohm & Haas Co.

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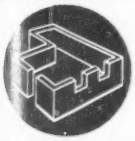	***1** Making water-repellent building materials?*	CALCIUM STEARATE — renders water repellent such materials as cement, cement composition, wood, brick, stone, fiber and fabric.
	***2** Suspending pigments, producing "flatting" or increasing body in paints, lacquers, or varnishes?*	CALCIUM STEARATE, ZINC STEARATE — produce flatting effect in lacquers. CALCIUM STEARATE, ZINC STEARATE, MAGNESIUM STEARATE — increase body in varnish; prevent settling of pigments in paints and enamels.
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	***4** Rendering crystals free-flowing and non-caking?*	CALCIUM STEARATE — coats crystals against moisture.
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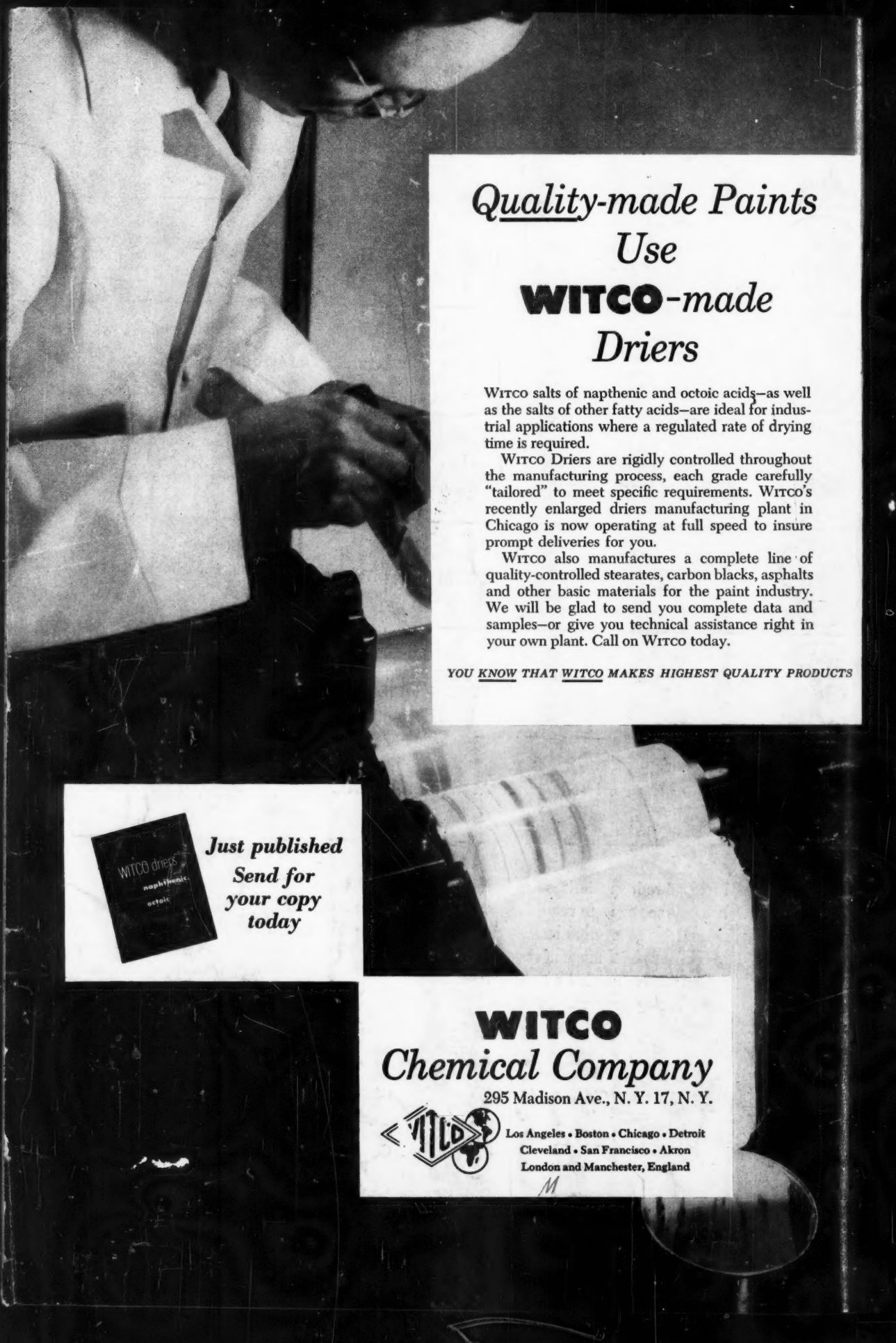

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